The Magazine of the Registered Professional Engineer

American Engineer

SEPTEMBER 1961

Documentation

Facts About Fact-Finding

A leading executive tells how to find obscure facts on engineering problems and how to keep track of them later.

Page 23

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"Electrotape Leapfrog" – world's fastest surveying

"Electrotape Leapfrog" slashes days, weeks, and even months from the time once required to make precise distance measurements. Required to play: a helicopter and a pair of Cubic DM-20 Electrotapes. Order of play: 1. Helicopter flies Electrotape #2 from start point to first tie-point, up to 30 miles away. 2. While Electrotapes measure distance to first tie-point, helicopter flies back to start point. 3. Helicopter flies Electrotape #1 to second tie-point, leapfrogging first tie-point. 4. While Electrotapes measure distance between first and second tie-points, helicopter flies back to pick up Electrotape #2. And so on. Leapfrogging eliminates packing-in through difficult terrain, saves clearing underbrush. Priced at $6000 apiece, Electrotapes quickly pay for themselves by saving operating time and cost. Weighing only 25 pounds, the DM-20 is all-transistorized and provides numerical distance readout. For descriptive literature on Electrotape, write to Department AE-104.

(Circle 1 in Readers' Service Dept.)

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American Engineer

SEPTEMBER 1961
Vol. 31, No. 9

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS FOUNDED 1934

BPA
Member, Business Publications Audit

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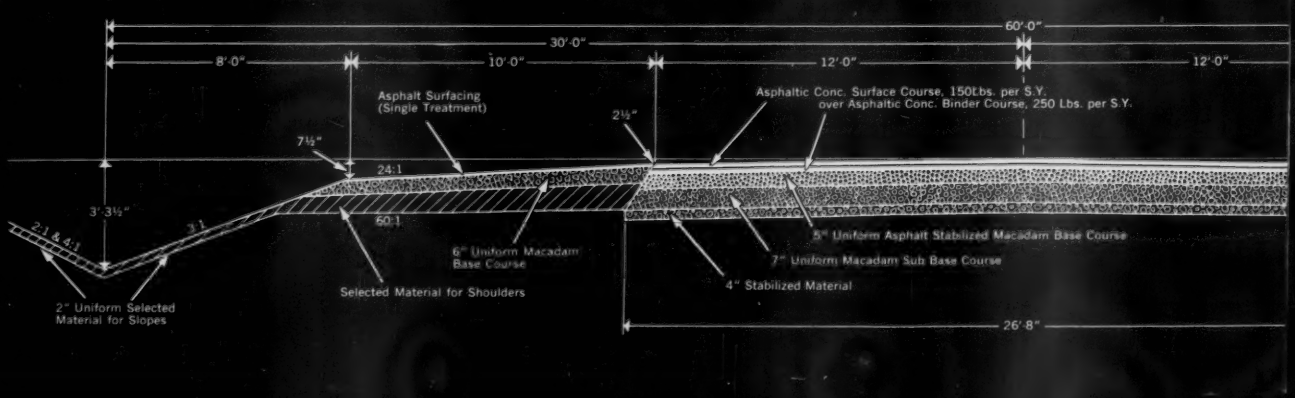
New DEEP STRENGTH Asphalt Section of South Carolina Interstate No. 26 extending from Route 296 to U.S. Route 176.

MACADAM SUBBASE course is spread and compacted to 7-inch thickness.



New Section of South Carolina

Interstate No. 26 uses DEEP STRENGTH Asphalt Construction

The expanding pattern on the National System of Interstate and Defense Highways is nowhere shown to better advantage than in the State of South Carolina, particularly regarding mileage under contract and mileage constructed. Of the approximate 680 Interstate miles in this state, some 325 miles are under contract. About 180 miles are in the latter stages of construction or open to traffic.

This record is the result of a combination of important factors, among which may be mentioned careful planning, an aggressive and intelligent group of State Highway Engineers, and the adoption of *stage construction* wherever feasible. Last but not least, the use of Asphalt in combination with local aggregates to reduce costs, speed construction, and give the State a highway system which is durable, smoother-riding, and well able to support any traffic loads of the foreseeable future.

An excellent example of South Carolina Interstate Highways is a section of I #26 in the vicinity of Spartanburg. Rainfall and temperatures are normal for the Southern region, and frost conditions are not a serious factor. The design includes a selected top-soil sub-grade, reinforced with crusher-run stone, an Asphalt-primed macadam subbase course, an Asphalt plant-mix macadam base and an Asphalt concrete binder and wearing course.

Asphalt base was a plant-mix macadam with aggregate graded from the No. 4 sieve to 2½ inches, heated and coated with 3% to 4% of 85-100 penetration Asphalt, laid 5 inches thick in one layer. (Recent contracts specify a smaller stone constructed in two layers.)

Shoulders follow the general criteria for the Interstate system, with 10-foot surfacing for the outside lane and 3-foot for the inside lane. Features that materially reduced shoulder costs were the use of selected material for the foundation course with a 6-inch uniform macadam base and an Asphalt single-surface treatment with ½-inch stone for cover.

Compaction was performed on the pavement structure with three wheel steel rollers, high contact pressure pneumatic tire rollers and tandem steel wheel rollers.

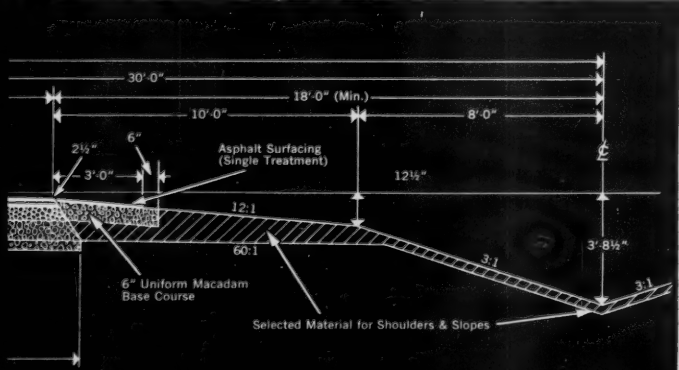
A study of the section below shows how this DEEP STRENGTH Asphalt design assures heavy-duty strength and durability. This application of DEEP STRENGTH Asphalt design principles is the result of many years of study, research, and experience in using local materials in combination with Asphalt by engineers of South Carolina's State Highway Department. Their invaluable engineering experience has saved many millions of taxpayer-dollars and provided extra mileage of Interstate Highways.

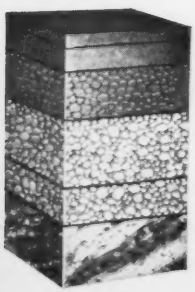
A new edition of the ASPHALT HANDBOOK incorporates all the Advanced Design Criteria implied in the term DEEP STRENGTH Asphalt Pavement. Write us for your free copy.

MULTI-LAYER SECTIONS consolidated for smoother riding by high contact pressure pneumatic tire rollers.

36-foot DEPRESSED MEDIAN with deep longitudinal drains assures good drainage and lowered water table.

THE ASPHALT INSTITUTE College Park, Maryland





HERE'S THE DEEP STRENGTH DESIGN OF SOUTH CAROLINA INTERSTATE NO. 26:

—A.	A. Asphalt concrete wearing course.	1½"
—B.	B. Asphalt concrete binder course.	2½"
—C.	C. Asphalt stabilized macadam.	5"
—D.	D. Asphalt primed macadam subbase course.	7"
—E.	E. Stabilized material.	4"
—F.	F. Subgrade or Improved Subgrade.	—
	TOTAL THICKNESS.	20"

Letters to the Editor

Problem to Solve . . .

Dear Editor:

I have just read "Let's Have Archineers" in the June issue of AMERICAN ENGINEER and highly commend it.

As late as 1951, I was hoping that I might find a college curriculum with contents similar to what was outlined in the article. I had one year of architecture at Carnegie Tech and began to realize that the training left something to be desired. So, I transferred to the Civil Engineering Department hoping to fill the gap, which I did.

However, as you might imagine, there was no coordination between the two departments—and no obvious appreciation of one for the other.

The point of this letter is not to reiterate what has already been pointed out, but to say that I think articles such as this one will act as guideposts, if read by department heads.

I am calling the article to the attention of the responsible people at Carnegie Tech.

WAYNE L. SMITH, P.E.
Columbus, Ohio

. . . Or Has It Been Solved?

Dear Editor:

I presume the feature "Let's Have Archineers," June, 1961, was held out of print for some twenty or thirty years and you, sir, failed to shake off the moth balls when giving it to the typesetter.

The course advocated in the article has been on the curriculum of various universities for many years. The graduates of such a course usually receive a B.S. degree in architectural engineering. Such graduates are accepted in the AIA and the ASCE. I received such a degree ten years ago and have seen the work of many Arch-E's since graduation. I agree with the author that such training is very suitable for building design and construction.

MARTIN W. KAUFMAN, P.E.
Kansas City, Missouri

Obstacles to Being "Learned" . . .

Dear Editor:

In the July, 1961, issue of the AMERICAN ENGINEER, William Lurie's article, "Engineering and the Learned Professions" brought out clearly the elements of a learned profession: Ideals, institution and inspires. The engineering profession will have to achieve them to be learned, he points out.

Lurie's conclusion seems correct. Yet, engineering's impact on today is tremendous. What's holding the profession back?

Here are some points to consider, for they sap the profession's strength:

- Excessive exceptions to the engineering registration laws which mock the concept of identification of members of a profession.
- Conflicts on how to carry out engineering work—for example, through private versus corporate practice, through government agency versus consulting engineers.
- Strong governmental support for unionistic employment practices for professional engineers.
- Dilution of the profession by personnel doing engineering work who lack professional engineering preparation.

Want the profession to grow? Remove these constraints; then jump out of the way—quick!

JAMES B. HENDRICKS, P.E.
Member, Schenectady Professional Engineers Society

Some Have Inspired

Dear Editor:

The ideas in the article in the July issue "Engineering and the Learned Professions" by William Lurie are worthy of considerable thought. His point seems sound that engineering, for it to be generally accepted as a learned profession, needs an institution analogous to the church, court, and hospital for theology, law, and medicine. But he is unduly derogatory to the past engineering leaders and cynical of their lasting and inspiring influence in his next to last paragraph as follows:

> "And inspirers? These are yet to come. For a profession the ideal of which is still in the process of formulation, a profession of which the institution embodying this ideal has not yet been developed—for such a profession the inspirers are still in the future."

Does he really believe that the inspirers are yet to come? What of Bell, Edison, Westinghouse, Hoover, Fritz, Kettering, Hirshfeld, Whitney, Von Karman, Jewett, Lamme, Sperry, Sprague, Langmuir, Modjeski, Stevens, Marconi? And what of the leaders in engineering education, many of whom also made their marks in engineering practice: Swain, Scott, Jackson, Talbot, Kimball, Wickenden, Schneider, Timoshenko, Potter, French, Christie, Compton, Bush? Have none of these notable engineers given inspiration to the engineering profession nor even to individual engineers?

D. C. JACKSON, P.E.
Aberdeen, Md.

Brains Do Help . . .

Dear Editor:

With respect to the letter in the July issue, I have two comments directed to Mr. W. J. Youngerman of Fairmont, Minnesota:

(1) For the sake of the engineering profession and more important, for the sake of the progress of our country, I hope that "technical engineering brilliance" is much more than "a small part of the professional engineer."

(2) I also hope that "conformance with the established rules" does not extend too far as being "the only way to success." Rather, I would try to note ethical conduct as being essential to a person who is to consider himself a professional.

PHILLIP PICKMAN, E.I.T.
Minneapolis, Minn.

S&E Program . . .

Dear Editor:

We would like to make a few comments on PFC Joseph J. Gallippi's letter in the June, 1961, issue of AMERICAN ENGINEER.

PFC Gallippi should consider himself fortunate to be utilized so fully under the Army's Scientific and Engineering Program. We, who have civilian engineering experience ranging from six months to three years, were selected directly from basic training for assignment in the S&E Program. After two months at the Engineering Research and Development Laboratories, Ft. Belvoir, Virginia, we were selected to fill specific S&E positions in Korea. Much effort was expended by our supervisors in trying to retain us at ERDL. However, a spokesman for the Department of the Army stated that our jobs in Korea were vitally important and that it was in the best interests of national defense to send us to Korea. The jobs were so vital that, a short time after our arrival in Korea, they were eliminated. The work consisted primarily of elementary drafting, such as charts, graphs, and other pictorial aids, and assisting on the survey party.

We were subsequently transferred to other units to work in non-S&E positions, even though such action is

(Continued on page 62)

For the engineer who refuses to stagnate

HALF the world is half asleep! Men who could be making *twice* their present salaries are coasting along, hoping for promotions but doing nothing to bring themselves forcefully to the attention of management.

They're *wasting* the most fruitful years of their business lives . . . throwing away thousands of dollars they may never be able to make up. And, oddly enough, they don't realize—even remotely—the tragic consequences of their failure to forge ahead while time is still on their side.

Engineers and other technically-trained men are particularly prone to "drift with the tide" because their starting salaries are reasonably high and promotions come at regular intervals early in their careers. It isn't until later—too much later in many cases—that they discover there is a definite ceiling on their incomes as technicians.

Send for Your Free Copy of "Forging Ahead in Business"

If you want to discover how to succeed while you are still young—if you want to avoid the heartbreak of failure in later years—send today for "*Forging Ahead in Business*" . . . one of the most practical and realistic booklets ever written on the problems of personal advancement.

Here you will find—not a "pep-talk," not an academic lecture—but cold, hard *facts* on how to improve your position and increase your income. You will be told what the qualifications of an executive are in today's competitive market . . . what you must *know* to make $15,000, $20,000 or more a year . . . what you must *do* to accumulate this knowledge.

"Forging Ahead in Business" was written for mature, ambitious men who seriously want to get down to bed-rock in their thinking about their business future. If you feel it is meant for you, simply fill in and return this coupon. Your complimentary copy will be mailed to you promptly.

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'62 Engineers' Week Theme Stresses Economic Growth

"Economic Growth Through Professional Engineering" will be the theme of the 1962 National Engineers' Week, February 18-24. Announcement of the theme was made by Warren G. Stadden, P.E., consulting engineer and architect of Roselle, N.J., who was reappointed national chairman of the annual observance by NSPE President Murray Wilson.

Chairman Stadden

Chairman Stadden pointed out that the 1962 theme was selected to "call widespread public attention to the vital role played by science and technology in our national economic growth and expansion, and the consequent economic strength of our individual citizens."

Promotional material being prepared for the Week by the National Society will emphasize the engineering applications of fundamental scientific data and principles which are currently bringing us into the era of nuclear power sources and the exploration of our solar system.

A number of leading professional engineers in industry, private practice, government, and education are once again being asked to lend their names as individual sponsors of the Week. A listing of the 1962 individual sponsors will be published in the October issue of AMERICAN ENGINEER.

The sponsors' names will be used on a letterhead for a mailing to publishers of daily newspapers, industrial executives of firms employing large numbers of engineers, consulting engineering firms, and engineering publications. This mailing will describe the activities and objectives of the Week, and will point out that contact should be made with local NSPE affiliates for details regarding participation in the events of the Week.

Promotional kits prepared by the National Society will be sent to state societies and local chapters in mid-October. The kits will be supplied in plastic, zipper brief cases which may be used throughout the year. The kits will contain sections covering suggestions for developing a basic Engineers' Week program at the chapter level. These suggestions will include such things as newspaper publicity on chapter activities, television and radio public service time, special newspaper sections, speakers bureaus, exhibits, and ideas for a variety of special projects. The kits will also contain a sample talk on engineering applications closely related to economic growth.

Promotional aids such as films for television spot announcements, tape recorded radio announcements, posters, banners, logotypes, newspaper mat stories, lapel buttons, gummed seals, and bumper stickers will be available from the National Society headquarters. Order blanks describing these promotional aids and listing prices will be sent to all local chapters and state societies. A series of "Action Letters" will be mailed from the National Society to keep local Engineers' Week committee chairmen informed as to new ideas for the Week and the availability of promotional material.

Meetings of Note

American Chemical Society—National Meeting — September 3-8, Chicago, Illinois.

Engineering Management Conference—Sponsored by American Institute of Electrical Engineers and the American Society of Mechanical Engineers—September 14-15, Hotel Roosevelt, New York, New York.

Standards Engineers Society—Annual Meeting, September 18-20, Hotel Sherman, Chicago, Illinois.

Association of Iron and Steel Engineers — National Convention — September 25-28, Penn-Sheraton Hotel, Pittsburgh, Pennsylvania.

Engineers Council for Professional Development—Annual Meeting, October 2-3, Louisville, Kentucky.

American Standards Association—National Conference on Standards, October 10-12, Rice Hotel, Houston, Texas.

American Society of Civil Engineers—New York Annual Convention, October 16-20, Hotel Statler, New York, New York.

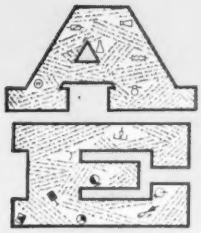
American Institute of Consulting Engineers—Annual Dinner, October 17, New York, New York.

Idaho Highway Department Recognizes EIT Papers

The Idaho State Highway Departent recently concluded the third annual conference of its engineers in training, awarding a plaque for the best technical paper to EIT's Ray Norberg and Odd Hogset for their joint effort on the report "Frost Damage Control Using Organic Frost-Retarding Materials."

The annual conference for EIT'S was established as another step in the effective engineer in training program which has been in effect in Idaho's Highway Department since 1952. The program is arranged to give graduates of accredited engineering colleges on-the-job experience leading to professional engineering licensing in Idaho. The program is divided into two phases. In the first, an EIT is assigned to one of the operating

(Continued on page 10)



"This Month"

With September one's thoughts turn to a winter of doing something constructive. Some attend art classes . . . get active in organizational work . . . or set about doing a trade magazine article that has been hanging fire for some months. If you're in the latter group (or if you're not) you'll find "This Month's" lead article about as interesting and informative as any we can remember. It's called "Facts About Fact-Finding," and is one you will want to file for the future. Page 23.

Two World's Fairs—one on each coast—are in the offing and science and engineering are bound to get top billing at both. We take an early reading on current developments beginning on page 30.

We know about Berlin and we hear much about NATO but have you ever heard of MWDP? It's the Mutual Weapons Development Program and through this unique group engineers and others from many nations are pooling their brains and working for the common defense. On page 34.

Page 38 brings us a fine piece by a leading Stone and Webster executive. Read what this experienced man has to say about an old and trying problem, "Commercialism vs Ethics."

Inventors contributed much to the progress of the U. S. but the question is now asked as to the treatment they presently receive by the government and industry. "Let's Change Preventives to Incentives"—page 43—cites some of the difficulties.

Shorts not to miss: Problems of fee schedules and anti-trust laws have implications for engineers is the subject for "The Engineer and the Law", page 33 . . . The AE Special Report, page 42, reviews a book on engineers' unions . . . and a new case is treated by the Board of Ethical Review on page 45.

The headlines "This Month":

General. Page 8. '62 Engineers' Week Stresses Economic Growth . . . Idaho Highway Dept. Recognizes EIT Papers . . . Survey Reveals Some Poor Recruiting Habits . . . Five States, 31 Cities Honored for Traffic Work.

Industry. Page 12. NSPE Plans More Programs for Engineers in Industry . . . Employment Scene Looks Good for '61 Grads . . . NSF Calls for Tripled Spending on Education.

Consulting. Page 16. NSPE Urges Support for Tax Equalization Program . . . Functional Section Sees Threat to Profession . . . Colorado Law Sees Two Professions as Duplicates . . . Insurance Bill Dies in N.D. House . . . Architect Gets Hit for Reconstruction Costs.

Education. Page 18. Jet Engine, Computer, Win Trip for High School Youths.

Government. Page 19. Sidebar Organizations Opposed by Appropriations Committee . . . White House Order Issued on 'Moonlighting' . . . Corps of Engineers Urged to Display P.E. Licenses.

Registration. Page 20. Rhode Island Is First to Adopt NCSBEE Model Law.

Kenneth E. Trombley

Editor

(Continued from page 8)

districts in the state and there works in at least three of the five major divisions: Construction, location, materials, design, and operation and maintenance. The first phase generally lasts two to two and a half years.

Under the second phase of the training program the EIT becomes part of an engineering pool and is assigned by his supervisor to jobs where his particular aptitude and abilities can be best utilized. This affords the EIT an opportunity to begin developing a specialty if he chooses. An EIT will normally remain in the second phase of training until he becomes a registered professional engineer.

The annual conference has proved a good incentive toward getting EIT's to write original papers. During 1960 an Idaho EIT was sent to the Highway Research Board Proceedings in Washington, D.C., to present his original paper on "Headlight Glare vs. Median Width," a practice which the Department hopes to be able to continue. The effectiveness of Idaho's program can be measured in part by the increasing numbers of graduate engineers who have participated actively in the program since its inception.

Survey Reveals Some Poor Recruiting Habits

If industrial firms really are not able to hire as many engineers as they need, a recent survey suggests they may have only themselves to blame.

The Equity Advertising Agency of New York sent out resumes to 100 firms describing the experience of an imaginary electrical engineer supposedly seeking new employment.

Out of the 100 firms contacted, 11 had not responded within three months. Of the 89 replies, 57 were received within ten days, with 19 taking more than two weeks.

Misspellings and grammatical errors were common. Ten secretaries signed letters for their bosses, as indicated by initials above or below signatures. Three secretaries signed their own names, and the personnel executive of one large firm amateurishly typed out his own letter.

Coordination between divisions of the same company was often poor. Out of 30 divisions contacted in ten large corporations, only one notified other divisions of talent they could not use themselves. One division reported no openings although they had advertised for a man with similar experience.

Fifty-eight of the 89 replies were form letters or telegrams. Fourteen others sent printed replies, one on the back of a post card. Only 17 replies were considered as attempts to establish personal rapport with the engineer.

Of the 89 answering firms, only 21 followed up their initial reply. One overly anxious company's initial response and follow-up were received on the same day, just four days after the original mailing.

Five States, 31 Cities Honored for Traffic Work

Five states and 31 cities have been honored by the Institute of Traffic Engineers for their traffic engineering work in 1960. The awards, which were based on information reported to the Annual Inventory of Traffic Safety Activities of the National Safety Council, were made by a committee of judges of the Institute. Chairman of the committee was Dr. Donald S. Berry, professor of civil engineering at Northwestern University.

Traffic planning, traffic control measures, traffic improvements and traffic engineering administration were among the items considered in making the awards. More than 800 cities and states submitted entries in the inventory program, which is designed as a self-evaluation of the traffic safety program of a city or state. The awards made by the Institute were all designated as "for maintaining a high level of performance in traffic engineering in 1960," and no ranking was indicated by the judges. The states receiving awards were California, Connecticut, Maryland, Michigan and Rhode Island. Sixteen other states were represented among the city awards.

Idaho EIT's

At the recent annual conference of EIT's in the Idaho State Highway Department, Engineers-in-Training Ray Norberg and Odd Hogset receive an award for their joint efforts on a paper entitled "Frost Damage Control Using Organic Frost-Retarding Materials."

Texas Interstate 35E, Stemmons Freeway out of Dallas.

Texas' 352 miles of Interstate awarded to CONCRETE promise big savings in upkeep!

Across Texas, modern concrete highways grow in length—a public reminder of the skills and dedication of the engineers and builders who are creating them.

A solid future is built right into roads like these. Only concrete enables engineers to design pavements to last 50 years and more.

Concrete isn't flexible, so there are no "moving parts" in it to cause hidden wear. And even with the highest temperatures, it won't soften and ripple under traffic. Concrete actually grows stronger year by year.

All these advantages mean extra thrift for Texas as it builds with concrete: Exceptional pavement life . . . upkeep costs that run far less than for asphalt. It's for reasons like these that most Interstate mileage across the nation today is going to concrete.

Texas Interstate 20, Dallas—Ft. Worth Turnpike.

38% maintenance saving with concrete, Texas' 31-year records show!

Official Texas State Highway Department records give the facts: Since 1929, road maintenance costs per mile per year for concrete have averaged $144.68; for asphalt, $235.23. Texas' new concrete highways will do even better!

PORTLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of concrete

(Circle 4 in Readers' Service Dept.)

NSPE Plans More Programs for Engineers in Industry

At the July annual meeting in Seattle, the NSPE Board of Directors approved a plan to form a new functional section within the Society for engineers in industry. The new functional section was proposed by the Engineer-in-Industry Committee to permit a broader range of activities on behalf of employed engineers.

Industry Committeeman William L. Crowder, of the Western Electric Company, bought out the aims and possible areas of action of the planned functional section. Speaking before industry engineers attending the meeting, Crowder described the advantages of the functional section type of organization, and outlined a suggested program of action. Among his proposed activities were periodic meetings of state functional section chairmen, forums for representatives of all nonbargaining engineering organizations, and a plan to provide a workshop of mutual respect and harmony between practicing engineers and managing engineers.

Under Board authorization, the Engineer-in-Industry Committee plans to meet within a month to begin drawing up organizational plans and procedures for the new functional section.

In other NSPE Board action, a policy statement was approved which permits professional engineers to assume the duties of striking nonprofessional workers when the health and safety of the public or the security of the Nation are endangered.

In recommending adoption of the new policy statement, the Engineer-in-Industry Committee noted in its report to the Board that past incidents had caused confusion over the proper actions of the professional engineer when nonprofessional employees strike, and that a clarification was necessary.

The policy statement is as follows:

"The engineer is ethically obligated to protect the public; therefore, he may properly assume the duties of nonprofessional workers involved in labor disputes in those cases where the assumption of such duties is for the protection of the health and safety of the public or the security of the nation."

Employment Scene Looks Good for '61 Graduates

In "An Open Letter to the College Graduates of 1961," Secretary of Labor Arthur J. Goldberg has told this year's engineering graduates that their prospects are good, despite some slowdown in recruiting activities by manufacturing firms.

"Graduates with majors in electrical, mechanical and chemical engineering are in the greatest demand," said the Labor Secretary, "but there appear to be more than adequate opportunities for graduates in other specialties."

Confirming reports from colleges, Goldberg said in his letter that employers this year are placing a great premium on academic achievement and class standing. "Men graduating near the top of their class and those with advanced degrees will be actively sought and will generally have considerable choice of location and type of work."

Regardless of class standing, however, Goldberg noted that the long run prospects for the engineering profession continue to be outstanding. Among the factors contributing to this continued demand are the increasing needs of the defense program, increasing complexity of industrial technology, the growth of population and industry, and increased research and development activity.

Supporting Goldberg's statement have come reports from several colleges and universities indicating that the starting salary average for this year's engineering graduate will probably settle around the $540-per-month mark.

Stevens Institute of Technology, which last year reported average engineering starting salaries of $525, this year announces a $543 average, with the top quarter of the class getting a record average of $555 per month.

(Continued on page 15)

FREE-NEW BOOK on HEATING and COOLING

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(Circle 5 in Readers' Service Dept.)

VALVE TIPS:

All Pilots Fit All Main Valve Sizes Downtime, Maintenance, Inventory Reduced

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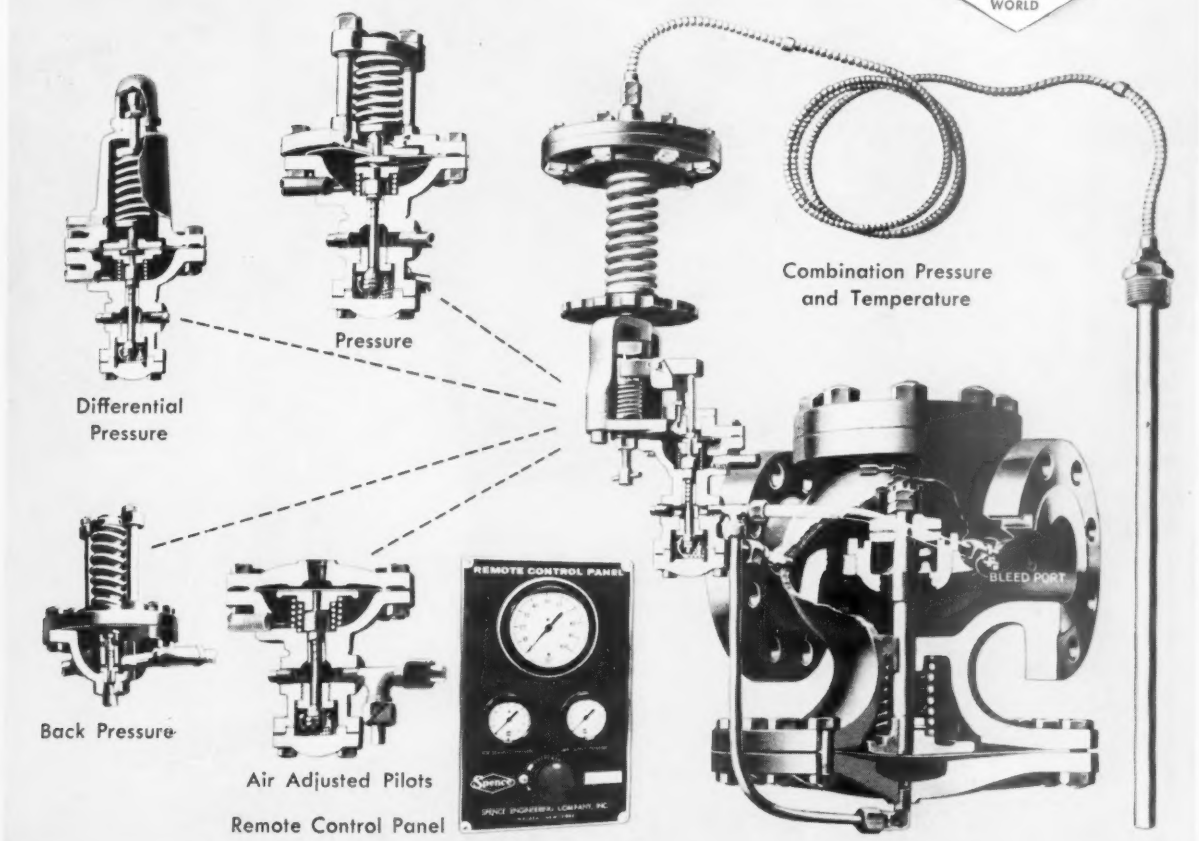

Let's start off by admitting there's no such thing as a "maintenance-free" regulating valve. Any valve that automatically controls temperatures or pressures within close limits can be affected by dirt in steam lines.

If trouble does develop, engineers want a regulator they can get back on the line — fast. That's one reason why more engineers are standardizing on Spence Regulating Valves with externally mounted pilots. The simple test of disconnecting the external bends establishes whether the trouble is in the main valve or the pilot.

If the main valve is the trouble spot, it can be maintained without removing the valve body from the line. If the pilot is the trouble spot, it is easily removed for cleaning. However, if production downtime is a strong factor, the fastest method is to install a spare pilot and it is inexpensive.

All Spence pilots fit all sizes of Spence main valves. If you have twenty pressure regulators, for instance, all you need is *one spare pilot*. It will fit all main valve sizes from ¼" to 12".

Another advantage of the Spence design is the external pilot is interchangeable. You can change the function of a regulator by merely changing the pilot. In many plants this can represent an important factor in reduced inventory costs because you only carry a few inexpensive extra pilots instead of complete regulators. Obviously, there is also a considerable savings in labor costs when a valve can be converted, in the line, from a temperature regulator to any one of various pressure regulators.

The pictures above show a few of Spence's wide line of automatic regulators. For more information write for Bulletin TE.

SPENCE ENGINEERING COMPANY, INC.
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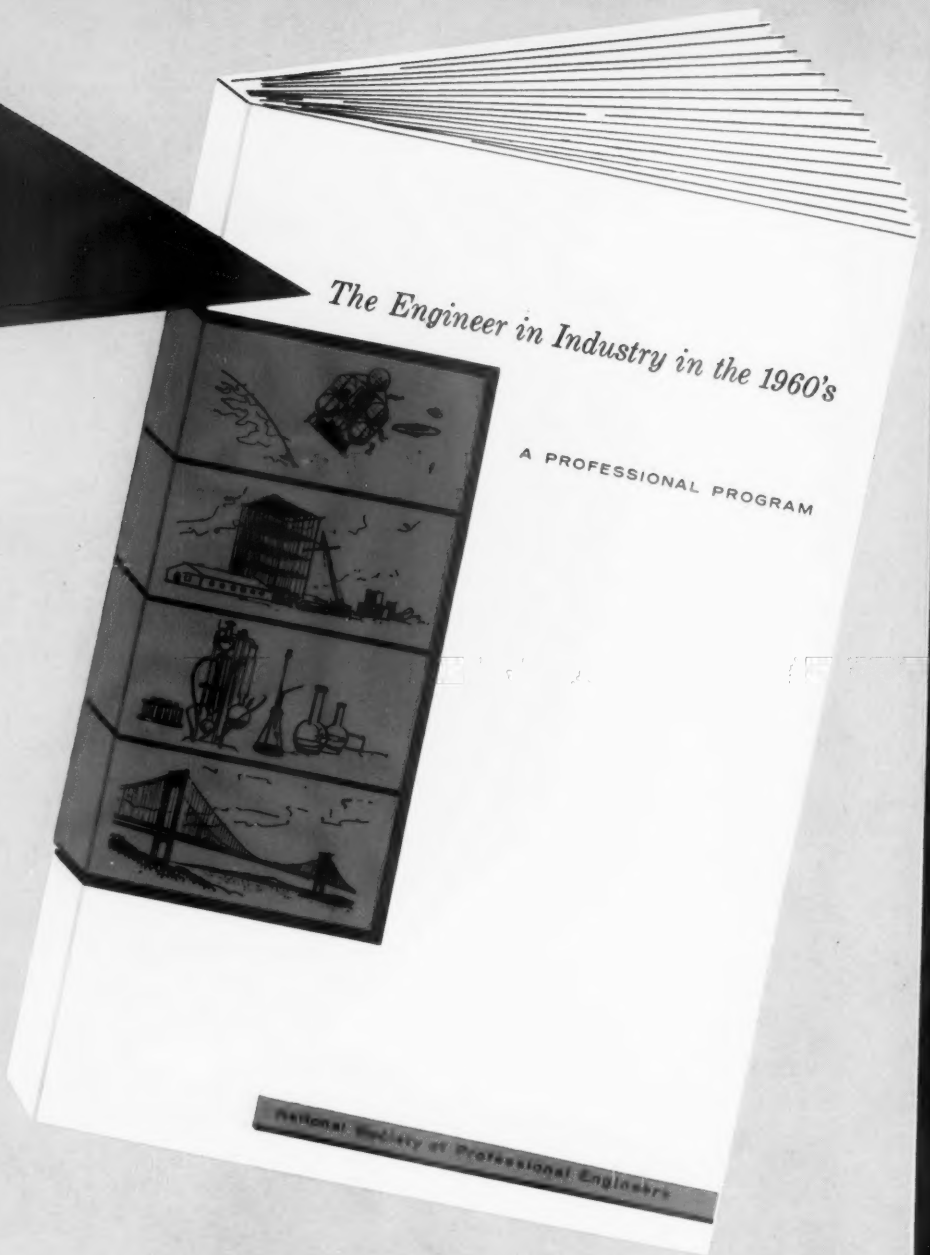
(Circle 6 in Readers' Service Dept.)

A NEW LOOK

at the Engineer in Industry . . .

The Engineer - in - Industry Committee of NSPE has taken a new look at **THE ENGINEER IN INDUSTRY IN THE 1960's** and discovered consistent professional advances:

- **He is less inclined to turn to unionism to achieve his aims.**
- **He now retains his starting salary advantage over graduating classmates in other fields.**
- **The "telescoping" of engineering salary ranges appears to have ended.**
- **Since 1956 salaries of experienced engineers have increased faster than starting salaries.**



Among the topics covered in the volume are: **Goals** of the individual engineer; National **labor policy** and how it affects the engineer in industry; the decline of engineering **unions**; sounding board organizations and **functional sections**; and engineering **management relations**. A vital section of the publication deals with **A PROFESSIONAL PROGRAM** describing methods for further improving the professional status of the engineer in industry. The detailed proposal for action set forth takes into consideration the joint responsibilities involved of management, the engineer and the professional society.

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(Continued from page 12)

Columbia University, which calls the engineering job market for this year "cautious and competitive," nevertheless reports average starting salaries in the neighborhood of $540. Columbia M.S. degree holders are getting around $600 per month this year, and Ph.D.'s are ranging from $750 to $800.

Rensselaer Polytechnic Institute reports average starting salaries for engineers and scientists of $6438 per year, or $536 per month. The Rensselaer placement director notes that this figure is about 70 per cent higher than in 1951.

In the Midwest, Iowa State University pegs starting salaries for its graduating engineers at $541 for the average, $540 for the median. The ISU release notes that seniors averaged four job offers each, and that fifty out of 298 plan to attend graduate school.

NSF Calls for Tripled Spending on Education

The United States must nearly triple its investment in scientific and engineering education and basic research during the next decade if it wants to maintain world leadership and satisfy the demands of a technological society.

A National Science Foundation report, *Investing in Scientific Progress*, points out that the U.S. cannot hope to compete with the rest of the world in sheer numbers of engineers and scientists, and must double the number of engineering and scientific doctorates now being issued each year. In addition, increased spending must make it possible for every qualified and interested young person to pursue a scientific or engineering education.

During fiscal 1961, the U.S. invested from all sources a total of $2.1 billion in the direct costs of college-level engineering and scientific education. If the number of engineering and scientific doctorates issued annually is to be doubled by 1970 (from 6,600 in 1960 to 13,000 in 1970), the total annual expenditure will have to reach $5.5 billion.

More specifically, NSF recommends the following:

- Increase professional college staffs from the present 100,000 to 175,000 by 1970.
- Over the same period, increase salaries of these staffs from $800 million to $2100 million.
- Increase spending for college facilities to $350 million per year from the current $150 million.

In addition, NSF calls for the following big jumps in college-level basic research during the next decade:

- Raise the number of professional research engineers and scientists from 45,000 to 85,000.
- Raise university research salaries from $345 million to $970 million annually.
- Increase yearly spending for college research facilities from $85 million to $360 million.

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NSPE Urges Support for Tax Equalization Program

In a statement presented to the Senate Finance Committee during brief, two-day hearings on House-passed self-employed retirement legislation, NSPE gave strong support to the proposed tax equalization program and urged its favorable consideration by the Committee.

The Society declared that present tax laws which inhibit self-employed professionals from establishing their own retirement programs are a "roadblock" to the complete development of the self-reliant, individualistic consulting engineer. "By permitting a self-employed consulting engineer an opportunity for retirement benefits equal to those of his professional brothers who are not self-employed," NSPE said, "the Keogh-Utt bill will materially assist his opportunity for freedom of thought and activity."

The only witness to speak against H.R. 10 was Stanley S. Surrey, assistant secretary of the Treasury, who told the Committee the bill would involve a revenue loss amounting to an estimated $358-million annually. He urged that action on self-employed retirement legislation be deferred until it can be considered in connection with a comprehensive and general tax reform study being undertaken by the Treasury Department.

Speaking for the NSPE-supported American Thrift Assembly, Dr. Roger F. Murray of Columbia University, answered Surrey with a detailed analysis of the bill's potential effects on Federal revenue. Dr. Murray, professor of banking and finance at Columbia's graduate school of business, pointed out that past experience indicates that the Treasury's estimate of revenue loss is far out of line. Basing his estimate upon the natural lag between enactment and full operation of any such measure, Dr. Murray put the first year's revenue loss at between $75- and $100-million, and said that even this estimate may be too high.

Representative Keogh of New York appeared at the Senate hearing as a witness in favor of his own bill. Sharply criticizing the Treasury for recommending a further delay, Keogh pointed out that there has been enough time for investigation of the measure. "The bill has been before the Congress since 1951 and the Treasury has never presented a solution," said the New York Democrat.

Long time opponent of the bill, Senator Albert Gore of Tennessee, led the opposition at the hearing, and hinted that he would again attempt to stop the measure on the floor of the Senate. Senator Long of Louisiana, an outspoken opponent of the bill last year, stated that he had been "converted" since then and will support the measure if it includes an amendment which he himself has introduced.

The Long amendment, tentatively agreed to by Keogh, would double the amount a self-employed person could contribute to his retirement plan, but would then cut in half the tax deductible portion of this sum. As presently worded, the bill would allow tax deferrals of $2500 or ten per cent of income, whichever is the lesser, for retirement plans. Arguing that corporate employees must pay taxes on their own contributions to a retirement fund, Senator Long favors an extension of this principle to H.R. 10.

Under his amendment, a self-employed individual would have to contribute $5000 to his retirement fund in order to gain a tax deferral of $2500 from income. This, he maintains, would more nearly equal the situation of corporate pension plans, where only the corporation's contribution is tax deductible. Keogh, while indicating he would accept any reasonable amendment, nevertheless pointed out that the trend in industry is to eliminate the employee's contribution to retirement programs, with the entire sum being contributed as an expense by the corporation.

With the hearings complete, the Committee will now consider the views presented in executive session before taking final action.

Functional Section Head Sees Threat to Profession

The chairman of the Louisiana Functional Section has told the Louisiana Board of Highways that present state policy on procurement of engineering services represents a threat to consulting engineers and the economy of Louisiana.

Speaking before the chairman and highway board members on June 28, Alvin M. Fromherz, chairman of the Louisiana Functional Section Committee, criticized the state's present policy of building

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up state engineering staffs to do all design work.

Pointing out that objective evidence indicates greater economy in the use of consultants, Fromherz said that the great backlog of work available would keep both private and state engineers busy "for the foreseeable future."

Reports from the state since the hearing indicate that Fromherz's talk was well received, and that the highway board and other state boards have taken steps to increase the use of consulting engineers in the future.

Colorado Law Sees Two Professions as Duplicates

Preliminary reports from Denver indicate that in the opinion of a Federal District Court judge there is a complete overlap between engineering and architecture in Colorado.

The opinion came when a consulting engineer sued in the Federal court to have the Denver building code declared unconstitutional. The Denver code provides that only registered architects can design public buildings over one story in height.

The judge denied a motion by the city to have the suit dismissed, and ruled that the engineer had a good enough case to get a full court hearing in the near future. The judge pointed out that in Colorado, state laws take precedence over municipal laws. In effect, said the judge, the Denver building code attempted to divide the professions of engineering and architecture, when the state law contained no such separation. "It is apparent from the statutory language (of a new 1959 state law) that . . . separation of functions no longer exists under Colorado law. Both architects and engineers are permitted to plan and design public buildings," concluded the judge.

Insurance Bill Dies in North Dakota House

A bill to require consultants performing work for public agencies to carry professional liability insurance has died in the North Dakota House Labor and Industry Committee, according to reports from that state.

Although the bill had passed the North Dakota Senate by the margin of 40 to 3, testimony before the Labor and Industry Committee by consultant groups was given credit for the Committee's rejection of the measure.

Architect Gets Hit for Reconstruction Costs

When the roof of a weaving mill proved unsuitable for its intended purpose, the architect who designed and supervised construction of the building was required to pay the difference between the original cost of the roof and the cost of the necessary reconstruction.

To meet the needs of the weaving mill, the building had to be air-conditioned, and a constant humidity maintained. A built-up roof with a vapor seal was required to prevent leakage from the outside and condensation from the inside. Within a short time after the building was completed, the owner claimed that an improper vapor seal, faulty drain flashings, and an inadequate fiberglass insulation material, had combined to allow such high condensation on the inside of the building that a complete reconstruction of the roof was necessary to carry on the weaving process.

The owner alleged in bringing suit that the architect had been negligent in submitting plans for a roof he reasonably should have known would not suit the purposes for which intended. The court agreed, and assessed damages against the architect.

Quoting from a previous decision, the court said, "While an architect is not an absolute insurer of perfect plans, he is called upon to prepare plans and specifications which will give the structure so designed reasonable fitness for its intended purpose, and he impliedly warrants their sufficiency for that purpose." (*Bloomsburg Mills, Inc. v. Sordoni*, 164 A. 2n 201, Supreme Court of Pennsylvania, Oct. 10, 1960.)

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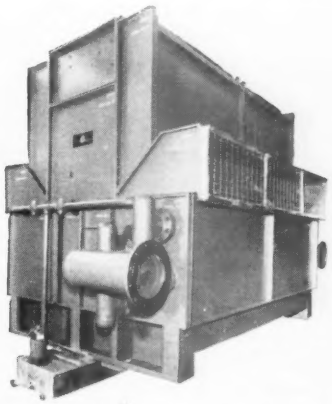

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Jet Engine, Computer Win Trip for High School Youths

A pulsating jet engine and a binary computer won National JETS awards for two high school graduating seniors and brought them to Washington, D.C., for a tour sponsored by NSPE.

Miss Shirley Joan Heuchert, 18, of Lansing, Michigan, received the 1961 JETS National Junior Engineer Award for her project involving the development and operation of the pulsating jet engine. The National Junior Technician Award was won by Charles L. Froelich, 18, of Defiance, Ohio, for his binary computer operated by telephone dial input.

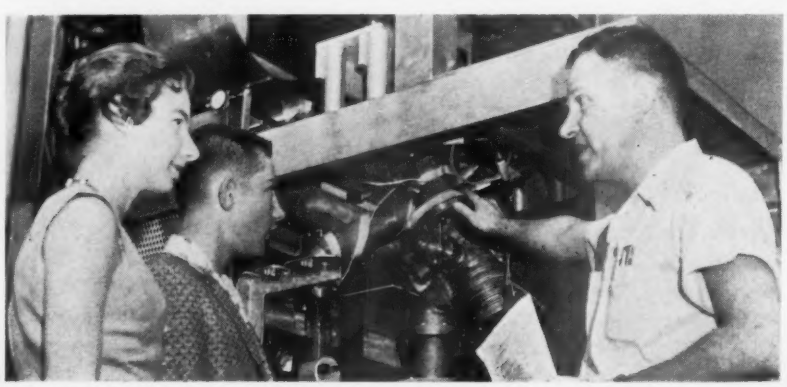
In New York City, the two winners were the guests of IBM at the new Thomas J. Watson Research Center, where they saw the STRETCH computer. In Washington, the two visited NSPE headquarters, and met Murray Wilson, NSPE president; Noah Hull, past president; and Paul Robbins, NSPE executive director. Accompanied by Dr. Richard T. Fallon, executive director of JETS, the winners toured the National Bureau of Standards, the Johns Hopkins Applied Physics Laboratories, and the Air Research and Development Command at Andrews Air Force Base. After their Washington trip, the group visited the Wright Air Development Laboratories at Dayton, Ohio.

Miss Heuchert, who says she has been interested in an engineering career for several years, has enrolled in Michigan State University. She is interested in the school's engineering for international service program, and hopes to "do engineering work in the foreign operations department of some American industry, or to work for the government in helping underdeveloped countries to utilize their natural resources and man power."

Charles is enrolled at St. Joseph's College, Collegeville, Indiana, and wants to be an electrical engineer and work on government projects involving missiles. His ten-unit binary computer will count from 1-1023. It makes use of a television transformer, a battery, a telephone dial, a number of tubes, neon lights, and resistances. He built the computer "to broaden my knowledge in the field of electronics."

Charles Froelich, JETS National Junior Technician Award winner, gets a review of professional society objectives from NSPE Executive Director Paul H. Robbins.

Above, Miss Shirley Joan Heuchert, winner of the JETS National Junior Engineer Award, and Charles show their trophies to Noah E. Hull, left, past president of NSPE, and Murray Wilson, current NSPE president at NSPE headquarters. Below, a tour of the National Bureau of Standards was one of the highlights of the JETS visit to Washington. Here the two winners listen to a description of the structure of an infra red spectrometer.



Appropriations Committee Hits Sidebar Organizations

The practice of governmental agencies contracting with various organizations for technical management, engineering and scientific evaluations and administrative services is resulting in the Government's "moving toward a chaotic condition in its personnel management," the House Appropriations Committee has charged.

In its report on the FY 1962 Defense Appropriation bill, the Committee noted that the use of "sidebar" organizations is increasing at a rapid rate, and warned that some hard decisions must be made in regard to this "mushrooming phenomenon" before tremendous injury results to vital defense programs.

While civil service salaries are regulated by Congress, the Committee report said, there are no laws to protect taxpayers from footing the bill for excessive salaries to employees of nonprofit organizations with government contracts. "To a considerable extent," the Committee charged, "the use of contracts with nonprofit organizations is merely a subterfuge to avoid the restrictions of civil service salary scales."

The Committee considered adopting a limitation which would prohibit the payment of salaries in "sidebar" organizations with defense contracts in any amount substantially in excess of applicable Federal pay rates. However, it was felt that such drastic action would bring about delays in vital military programs now under way and create further confusion rather than eliminate it.

The Committee has asked the Secretary of Defense to establish a realistic policy concerning "sidebar" organizations prior to presenting his next annual money estimates. "In the absence of any such policy," the report warned, "the Committee expects to recommend in the next annual Defense Appropriation bill that severe restrictions be imposed on these organizations."

White House Order Issued on "Moonlighting"

A recent White House order, issued to all departments and agencies, sets forth some general standards on outside employment of Federal employees. The order is designed to provide a general outline of employee conduct which will be supplemented by individual agencies and departments.

The order declares that Federal employees have the same right as other citizens to hold outside jobs if they wish to, or if they feel the economic need for doing so. However, such employment, with or without compensation, must not in the opinion of the agency head concerned: (a) Interfere with the efficient performance of the employee's Government duties, or (b) bring discredit upon, or cause unfavorable and unreasonable criticism of the Government or the agency concerned. The White House directive adds that agency heads may place additional restrictions on outside employment where special circumstances exist.

On the question of conflict of interest in outside employment, the general standard is as follows: "Employees may not engage in any outside employment, including teaching, lecturing or writing, which might reasonably result in a conflict of interest, or an apparent conflict of interest, between the private interest of the employee and his official government duties and responsibilities."

Other rules included in the standards of conduct code cover gifts, financial interests, use of Federal property, indebtedness and misuse of information.

Corps of Engineers Urged To Display P.E. Licenses

In an official memorandum signed by Brig. Gen. W. C. Hall, director of personnel, the Army's Corps of Engineers has authorized and encouraged all engineering and architectural personnel to display professional registration certificates in their immediate office. The official notice declared that such a procedure "would stimulate professional registration of other Corps engineers and architects." The order is an outgrowth of a suggestion received during the Chief of Staff Suggestion Month which was "heartily endorsed" by the Chief of Engineers.

"Silly me! I must have had two reference sheets stuck together when I did that drawing."

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(Circle 10 in Readers' Service Dept.)

Rhode Island Is First to Adopt NCSBEE Model Law

Rhode Island has become the first state to adopt the 1960 revised version of the NCSBEE Model Law for the registration of professional engineers. Some changes were made, however, in the section of corporate practice and exemptions were written in for manufacturing and research activities.

The change made in the Model Law's section on corporate and partnership obligations adds language to emphasize the liability, both jointly and severally, of the individual registered professional engineer and the partnership, joint stock company or corporation.

The Rhode Island Legislature has also added a specific clause to exempt from the registration act, "the practice of engineering by manufacturing corporations, and their officers and employees while engaged in manufacturing, research or development activities for such corporations." Similarly, an exemption has also been included for the practice of engineering "by research or development corporations, and their officers and employees while engaged in research or development activities for such corporations."

Another change made in the Model Law is the provision in the Rhode Island Act which authorizes an engineering graduate, with twelve or more years of satisfactory experience, to become registered upon successful passage of an eight-hour written examination in the principles and practice of engineering. The eight-hour written examination in the fundamentals of engineering, as suggested by the Model Law, would be waived.

The new Rhode Island law was signed by the governor in June.

Registration Law Amended For EIT's in Tennessee

Cooperative efforts between the Tennessee Society of Professional Engineers and the state engineering registration board were successful in securing an engineer-in-training amendment to the Tennessee law during the 1961 legislative session.

The new section authorizes EIT certification to engineering graduates or senior students who successfully pass a written examination, and to nondegree applicants with a record of six or more years of satisfactory experience who can also pass a written examination. The law provides that EIT certification "shall exempt the holder from a portion of the written examination which may be required by the Board for professional registration."

Texas Amendment Gives Legal Status to EIT

The State of Texas recently amended its registration law for the first time since 1937 to give legal status to engineers-in-training.

The law, passed just before the 57th State Legislature locked doors for adjournment, does not actually alter the Engineering Registration Act. It adds to the Act a clause which gives legal recognition to the engineer-in-training, tying him closer to the profession and gaining reciprocity for the Texas EIT in those 47 states which already have an EIT status.

Upon passage of the bill the Texas Society of Professional Engineers expressed the hope that this would also prove to be a deterrent to the loss from Texas of many young engineers, and that it might actually be an attraction for encouraging other engineers to move into the State.

New Jersey Appointment

Albert L. Blackwell, P.E. of Ridgewood, N. J., a consultant in civil engineering, was sworn in recently for his second five-year term as a member of the five-man State Board of Professional Engineers and Land Surveyors. Attorney General David D. Furman (r.) administered the oath of office, with Mrs. Blackwell holding the Bible. A former chairman of the Board, Mr. Blackwell was recently named for reappointment by Governor Robert B. Meyner. He received confirmation by the New Jersey Senate. He is a past president of the Bergen County Chapter, NJSPE.

Strictly Business

Personalities . . . **Buell Engineering Company** has appointed **Schaeffer E. Specht** as general sales manager . . . **Bernard Johnson & Associates,** consulting engineers, announce the expansion of their staff to include **Ernest C. Kobs, Jr.** . . . Deane M. Truesdell and Ellis, Arndt & Associates of Flint, Mich., announce the formation of the firm **Ellis, Arndt & Truesdell** to practice architecture, consulting engineering and landscape architecture . . . **Konski Engineers** of Syracuse, N.Y., have announced that **Leonard Spiegel** has joined the firm as chief structural engineer . . . **A. J. Buford** of St. Louis has been named merchandising manager for agent sales in **Keasbey & Mattison Company's** asbestos-cement pipe sales division at Ambler, Pa. . . . **Fuller Company** has announced the appointment of **Gen. Harry A. Markle, Jr.,** to the position of director of engineering . . . Appointment of **Fred D. Zikas** as sales engineer for mobile equipment components has been announced by the **Parker-Hannifin Corporation** . . . **John Girand** has been appointed to the **Arizona State Board of Technical Registration.**

Mr. Specht

E. L. Holbrook has joined the **Barker Instrument and Machine Company** as director of engineering and sales, Fluid Control Equipment . . . **H. DeForest Hardinge** was appointed vice president of the **Hardinge Company, Inc.,** and **Hardinge Manufacturing Company** during a recent meeting of the board of directors . . . **Clayton Enlish** has been elected chairman of the board of **Sturtevant Mill Company** . . . The appointment of **Harmon Q. Avera** as head of the Photogrammetric Research & Development Department of **Bausch and Lomb Inc.,** has been announced . . . Appointment of **William H. Grumet** to the position of division manager, Cascade Research Division of **Lewis and Kaufman Electronics Corp.,** has been announced . . . **R. T. Eakin** has been named vice president in the Engineering and Construction Division of **Koppers Company, Inc.** . . . **G. B. McGuire** has joined **The Badger Manufacturing Company** as vice president and construction manager for foreign and domestic construction operations . . . **Robert D. Dewell** has recently joined **J. H. Pomeroy & Co., Inc.,** as chief engineer . . . **Rigdon Currie** and **Sanford M. Roberts** have joined **Bonner and Moore Engineering Associates** to help organize a process analysis and control activity.

Mr. Holbrook

Porter W. McDonnell, Jr., has been named chairman of the civil engineering technology program at the **Ohio College of Applied Science** . . . The appointment of **Lombard Squires** as assistant general manager of **DuPont's** Explosives Department to administer the company's activities for the Atomic Energy Commission was announced recently . . . **Radio Corporation of America** has appointed **Dr. Raymond M. Wilmotte** as project manager to head the RCA's development and construction of the relay experimental communications satellite . . . **Murray G. Crosby** was named chairman of the board and director of research recently in the **Crosby-Teletronics Corporation** of Syosset, L. I. . . . At the recent annual stockholders meeting of **Golden-Anderson Valve Specialty Company, John H. Kilmer, Jr.,** was elected president and general manager . . . **James McWhirter** has been elected vice president of **Pennsalt Chemicals Corporation** . . . **Ilikon Corporation** has named **Ole A. Sandven** as vice president and director of the Physical Metallurgy Department . . . **Robert L. Anderson** has been named project manager at **Designers for Industry, Inc.,** Cleveland, O. . . . **Marcel Verrando** has been named chief engineer of **Trinity Equipment Corporation,** Cortland, N. Y.

Mr. McDonnell

Maj. Gen. John A. Barclay (ret.) has joined **The Lionel Corporation** as vice president for research and development . . . **Carl Abresch** has been promoted to vice president—product engineering, at the **Waste King Corporation,** it was announced recently . . . **Yardney Chemical, Inc.,** has named **Carl Horowitz** as chief of chemical laboratories . . . **Carl E. Anderson** has been elected president and chief executive officer of **E. W. Bliss Company** . . . **C. H. Jackson** has joined the **Hi-Shear Corporation** as staff engineer, Ordnance Products and Systems, and will direct special ordnance systems and devices . . . **Myron E. Hunzeker** was recently promoted to manager of **The Trane Company** sales office in Peoria, Ill. . . . **Infrared Industries, Inc.,** Western Division has announced the appointment of **John C. Christian** as manager of Military Electronic Sales . . . **Bert DePledge,** retiring senior vice president and a director of United California Bank, has been named to the board of directors and executive committee of **Coleman Engineering Company, Inc.** . . . **C. Kenneth Sulger** has been promoted to general sales manager for **Ampex Computer Products Company.**

Maj. Gen. Barclay

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(Circle 11 in Readers' Service Dept.)

Facts About Fact-Finding
A leading executive tells how to find obscure facts on engineering problems and how to keep track of them later.

facts *about fact-finding*

By
ROBERT S. CASEY, P.E.
Chief Chemist
W. A. Sheaffer Pen Co.

You are doing one aspect of engineering documentation right now—you're reading this and obtaining information.

When you are not *seeking* engineering information you may be *creating* it. When you're not doing either, you are *using* engineering information or *communicating* it to others. All those things are parts of engineering documentation. You're concerned with some aspect of it every working day.

The central idea of engineering documentation is engineering information and how to deal with it. The creation and use of engineering information is the one activity common to all branches of engineering and all engineers.

You probably make notes and keep records of measurements, observations and ideas. These notebooks, file cards and pieces of paper must be arranged by some standard so that you know what you have and can find and use it quickly. From time to time your measurements, observations and ideas will need to be tabulated, rearranged and correlated, so that conclusions can be drawn, and reports made.

Also, we all know that occasionally we must search the literature, which is another aspect of documentation. We look upon that chore as a pain in the neck. Usually searching the literature is the only thing we think of when we hear or read engineering literature or documentation.

When we see the exploding increase of scientific publications, we realize the need for more effective means of finding relevant engineering information. Hundreds of thousands of dollars have been spent on investigations to get information that had already been published.

The basic commodity sought is engineering information. The commodity can be manufactured in the laboratory or pilot plant. It can be mined from published sources, or it can be harvested from field trips, interviews and observations.

As with many other raw materials, engineering information must be processed to be useful.

An orderly plan is necessary for properly recording observations and ideas, if the information is to be found and used when needed. The plan or system should be no more elaborate or complicated than required but should be designed to do the particular job at hand.

The information to be recorded will probably be in one of three main categories:

- Original observations, measurements, ideas.
- Notes and abstracts from reading and study.
- Routine analyses and measurements.

Engineering Information

Create — Find
Record
Abstract — Organize
Store—Retrieve
Communicate

Original Information

This is the most fundamental of all scientific records. Here is where the raw, crude product is generated and starts on its way toward becoming a useful commodity.

The first consideration in making this original record is immediacy. One should write down at once, with date, the observations and measurements in their most primitive form without waiting for recalculation and transformation. Such notes, especially numerical data, should be entered in the notebook initially and not copied from scraps of paper. Copying courts errors.

Such original notes are the only records not expressly intended for reading by others. It may be advantageous if they can be read by others, but immediacy takes precedence over intelligibility.

It is desirable to write complete sentences and use only standard abbreviations. Telegraphic jottings and indiscriminate abbreviating may result in ambiguity. However, getting the record made, and intelligibility to the maker are the real essential matters. A few key words or symbols are better than making no record until it can be done grammatically.

A pocket notebook can be used for keeping all kinds of notes, but for original observations and ideas

a notebook is essential. A diary type record in a bound notebook with prenumbered pages is recommended. Such a record is most useful for patent applications and for litigation, neither of which may have been anticipated when the record was made.

Notes and Abstracts

Note taking of the second type—notes from reading and study—differs from the first in that the ideas, observations and figures are someone else's. The object of the notes is to assist the note taker in assimilating the subject being studied, or the object may be to use the measurements and observations in one's own work, or in preparing a survey or summary. In all cases, the source of the information should be recorded.

Whatever the ultimate object, the first step after the notes are taken is organization. Each reference should be on a separate card. Identification of the reference should be given, followed by an abstract or extracts from the reference. There might be a separate sheet for each chemical compound or material of construction, or for each kind of machine or process and multiple entries from various sources entered on each sheet. The source of each item should be identified. The information can then be studied by arranging and rearranging the cards or pieces of paper into whatever order serves the purpose.

Even though self-instruction is the only object of the reading and study, it is recommended that notes of some sort be taken. Actually writing down an idea, abstracting what one reads or sees, clarifies the idea and is an adjunct to learning and to clear thinking. To assimilate an idea or concept, it is necessary to do more than passively read the text or stare at a diagram or map. The mind must take the information, reassemble it into an articulate pattern and put out something. The putting-out must take the form of physical activity such as repeating the idea or concept verbally, that is in words and preferably in writing.

Routine Analyses

Special forms and systems have been developed to facilitate the recording, processing and use of routine observations and measurements. Obviously, the forms must be specially designed for each application.

Sometimes it is convenient to make audible notes and records. Tape recorders and dictating machines have been recommended for recording instrument readings and all sorts of observations, especially observations of a rapidly changing phenomenon. A portable tape recorder can be taken on plant and field trips to record observations and interviews. Especially suitable for hard-to-get-at places such as mines and construction projects is a portable microphone, attached to the lapel, and connected with a small radio transmitter carried in the pocket.

Don't overlook the occasional need for pictorial notes, photographs taken to show progressive results of tests, before and after effects, construction progress, and to record wiring, piping and other details which later will be obscured or buried.

THE ability to abstract well is a valuable talent. Its usefulness extends far beyond writing abstracts. Abstracting is picking out what is pertinent from a larger mass of data.

Abstracts, like reports, are to be designed according to their purpose and audience. Abstracts may be *descriptive:* "A discussion of the use of organic solvents;" or *informative:* "An effective cleaning solvent for removing vegetable oil from metal parts consists of ethyl alcohol 50 per cent and acetone 50 per cent." A descriptive abstract tells the reader what he will find if he reads the article. An informative abstract gives the specific information the abstractor thinks the reader will need.

Communication of engineering information is also one of our most important activities. A piece of research is of no value whatever until it is communicated to those who can use it.

Facts do *not* speak for themselves. Facts can't speak at all until they are understood by the readers or listeners. That is the key to effective communication — comprehension in the minds of other people. Simply stringing words together and attaching a blueprint isn't necessarily communication.

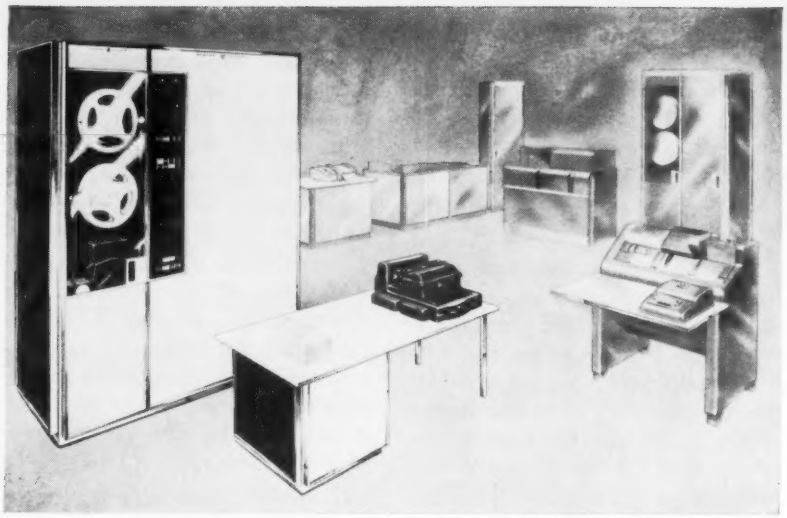
This mention treats communication more sketchily than its importance deserves. In contrast to some of the other aspects of documentation, the significance of communication is more widely appreciated by engineers. Most of us are aware of the importance of effective communication and realize our own need for improvement.

Report Preparation

Why is the report necessary? Who is to receive it? What does

A systematic card file for facts using coded notched cards can facilitate a search for documents of a certain type.

DOCUMENTS FILED BY SERIAL NUMBER
CARDS KEPT IN ALPHABETICAL ORDER BY AUTHOR
SEARCHING CARD FILE FOR A GIVEN SUBJECT
EDGE PUNCHED CARDS FOR BIBLIOGRAPHY



The need for documentation has become great enough to justify the development of complex machinery for the purpose such as the system shown here which is used by Western Reserve University.

he want to know or need to know? What do you want him to do about it? For example, a research project resulting in a new product could lead to the following entirely different reports:

- To the legal department for patent application—what is new; exact procedures, materials and processes; quantitative data.
- To the board of directors—cost and market information; potential profit.
- To the advertising and public relations departments – performance data; what the product will do for the consumers; what it means to them, a whiter wash or more miles per gallon; a new building; more people employed; human interest stories about the product's development.
- To an engineering society meeting or journal (the oral report would differ from the printed report)—engineering aspects, charts, graphs, tables of quantitative data; significance to the profession and industry.

Much has been written recently to help engineers write simple exposition. There is less emphasis on traditional rules of grammar and more on specific how-to-do-it techniques. The most common mistakes in technical reports have been analyzed and recommendations given for construction that leads to conciseness and clarity of expression avoiding ambiguities.

Visual communication should supplement, and in some cases can supplant verbal communication. Recommendations are available for the preparation and presentation of visual material: Graphs, charts, diagrams, maps, drawings, photographs. Specifications for comprehension as well as for visibility have been developed not only for pictorial material but also for the tabular presentation of non-numerical as well as numerical data. Occasionally demonstrations of processes and methods are useful. Exhibits and scale models are being more widely used, not only for display and public relations purposes, but as an adjunct to engineering and design, for instruction of supervision and to reduce maintenance in the finished structure.

One of the first things we do with information is to organize it, pick out the various items of interest and arrange them in order or in groups. Intuitively, we say or write first the facts, opinions or notions we consider to be the most important. Next we consider related items all in order.

Another aspect of organization is the subject matter analysis preliminary to setting up a file for the storage and retrieval of engineering information. We study the subjects covered in the file and compose a classification scheme or an index of the subject headings.

In preparing an oral or written report we develop an over-all plan for presenting our facts and ideas. Then we work out the details for carrying out the plan. Sound organization is not only necessary for clarity but it permits economy of words. Many relationships among facts and ideas become implicit in their order of presentation or arrangement.

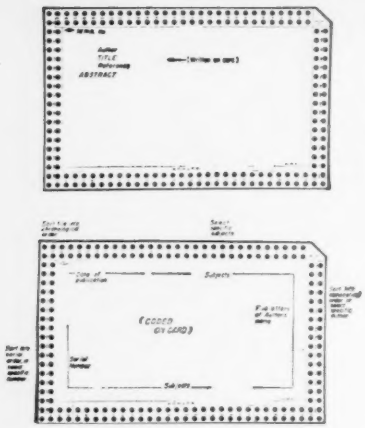
We hear much about logical arrangement of facts. However, the object of organization is to arrange the facts in such order that they will be most easily understood by the listeners or readers.

First you'll prepare a generalized topical outline of the main subjects with a single word or phrase for each division. As you study your notes, you will enter facts, ideas and bits of information under the appropriate headings. Then treat each of the main divisions as a separate report. Arrange the topics under each division in order, with sub-headings if necessary. Write specific sentences for at least the main headings to bring the ideas into more definite focus. Also, these sentences provide the openings for the various sections of the report.

A generalization followed by detailed explanation is a device frequently used in reports. The first paragraph of each section may be a general statement of what is to be developed in that section. Similarly, each paragraph usually starts with a topic sentence.

Sequence is vital in sections involving description or procedure. A time sequence is usually adopted for describing the steps in a laboratory or other sort of procedure. Spatial or geographical sequence is used in describing a physical entity such as the arrangement of equipment in a factory, or of buildings on a plot of ground. First, give a generalized over-all view, then from a suitable starting point describe each part in order. The relation of each part to the others must be kept clear, and the relation of the parts to the whole should be emphasized by occasional reference to the preliminary over-all view. Time and space sequences can be used concurrently.

Proximity is the principle of



Shown here are samples of the cards which can be used for author/title cards and abstracts, then coded by the use of the notches around the edge.

placing sets of facts or statements in juxtaposition, or some other parallel arrangement. This is effective for emphasizing contrast, cause-and-effect or problem-and-solution relationships or other comparisons. For example, a statement of production output when a previous process was used, followed immediately by a statement of present output, is more vivid than separating the related statements by a "logical" buildup or explanation. It is an effective attention getter in the introduction. The detailed explanation can come later.

Classification is the grouping of things according to similarities and differences. This principle is useful in organization when you can arrange substances, facts or ideas into groups so that with only a few statements you can point out group similarities or differences. Classification must be consistent throughout. That is, the grouping must be according to color, or shape, or function, consistently, so the groups will be mutually exclusive.

Partition or analysis is the process of dividing a unit into its component parts, telling about each and their relationships for a better understanding of the whole. As with classification, the viewpoint or basis must be consistent. Thus, we could partition a drying oven by describing the function of each of the various parts—blower, thermostatic control, ducts and vents—or we could describe their construction and physical characteristics but the two bases should be kept distinct.

Emphasis and viewpoint must be kept in mind during organization, especially if the purpose of the report is to do more than factual reporting of technical information for technical people. If the report is for the lay public, the emphasis will be more on the significance of the facts than on the facts themselves.

The beginning and ending are the most important parts of most reports, oral or written, short or long. The first few sentences must catch the reader's or listener's attention and interest or he won't continue to read or listen. The ending is equally important. Conclude with a brief, lucid summary including something specially interesting and vivid.

We have just seen that when organizing our information prior to composition, we started with many separate facts, observations and ideas. The problem was to fit them together into a smoothly functioning whole. That was *synthesis.*

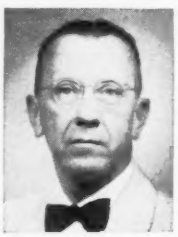
When organizing for storage and retrieval the problem is *analysis,* breaking down the intellectual content of our reports, reprints or card files into appropriate units of information or bits of subject matter which can be used to categorize and differentiate each individual document. Furthermore, when we scan indexes we need to analyze the concept we are looking up so we can choose various words and phrases any of which the indexer may have used to express the subject we're seeking.

Most references will contain information on more than one of the subject items. This makes it awkward to attempt to file references or cards according to subject. It is necessary to use cross-references. For example, in a card file of chemicals it may be necessary to make five or six copies of each card. One card would be filed in alphabetical order according to the name or composition. Others would be filed alphabetically according to specific properties such as color or boiling point range, others according to functions, such as "solvent for waxes," "antioxidant," "fungicide." This permits searching for substances under a number of different categories, but the large number of cross-references could make the file unwieldy. A file of one thousand items could contain six thousand or more cards.

Punched cards offer a way out of this dilemma. The simple edge-punched cards are well suited to small individual files. Meanings are assigned to the holes which are punched along the edges of the cards. Then those holes whose meanings are appropriate to the material written or typed on the card are clipped open to the edge forming a notch. When a sorting needle is inserted in a given hole in a pack of cards and lifted, those cards drop which are notched in that position.

(Continued on page 57)

About the Author . . .



Mr. Casey

Robert S. Casey, P.E., is presently chief chemist with W. A. Sheaffer Pen Company Fort Madison, Iowa. He received his B.S. from Trinity College in 1919, and his M.S. the following year. He has authored more than 30 journal articles and one book on aspects of documentation and is an abstractor for *Chemical Abstracts.* He is a member of the American Chemical Society, AICE, NSPE, as well as a member of the Advisory Board of *Chemical Literature.* Among his awards are the 1946 Anson Marston Award of the Iowa Engineering Society and the 1949 Iowa Gold Medal Award of the Iowa Section, ACS.

FROM WASHINGTON

BY
MILTON F. LUNCH,
N.S.P.E.'s Legislative Counsel

Shuffling School Funds ►

No one can be sure what will finally happen with regard to pending proposals for Federal aid to education, but at the moment the best bet is that none of it will go through during the current congressional session. The Administration still has one ace to play—tying some of the proposals to the congressionally popular program of Federal financial assistance to Federally-impacted areas (those areas which bear a heavy educational burden because of the influx of families arising from the establishment of a Federal operation). There is also some outside chance that the National Defense Education Act may be extended, but this is not urgent as the existing program does not expire until next year and its continuation can be acted upon during the 1962 session.

Both the Senate and House Education Committees have reported bills to extend and revise the National Defense Education Act. Rather surprisingly, both groups have suggested that the technician training program be so broadened in scope that the result would be to virtually terminate technician training assistance. This would be accomplished by striking the language added on the Senate floor by Senator Bush of Connecticut, which declares that the funds for this program be used exclusively for training "as highly skilled technicians" in fields "requiring scientific knowledge." The Senate Committee report is clear in stating that it wants to broaden the coverage to include training funds for such skills as pipe fitter, electrician, tool makers and agricultural workers. Senator Bush is expected to wage a vigorous fight to retain the high level technician concept, but he will be opposed by those favorably inclined toward the position of the sponsors of the amendment—the trade unions and the vocational guidance group. A likely compromise on this point and other controversial aspects of proposed changes in the law would be a short term extension of the law as it is, to be followed by more deliberate consideration of what changes should be made for the future. The proposed revision of the technician training program at this time is in conflict with President Kennedy's idea that the entire vocational education area should be studied by a committee of experts to determine if existing programs reflect the rapid technological changes of recent years.

◄ *Problems of Supply and Demand*

An "Annual Review of the National Science Foundation," conducted by the House Committee on Science and Astronautics, declares that there is a need to interest more undergraduate students in engineering careers to meet the expanding national requirements for an ever increasing need for highly trained technical people. At the same time, the Committee concludes that there is a need for a college or department of astronautical sciences at our technological universities "as the need for aeronautical engineers decreases." While the two conclusions are not in conflict, they do illustrate the growing perplexing problem of the increasing overlap and mixture of engineering and science, particularly at the more sophisticated levels.

Dr. Bowen C. Dees, NSF assistant director for scientific personnel and education, told the committee that the problem in interesting high school students in engineering careers arises from the fact that there is no engineering taught as such at the high school level. "Unlike physics, chemistry, and biology, where we can reach into the schools and work with the teachers and . . . help in the devising of better motivational materials, this is not possible directly with engineering." He said that the drop in freshmen engineering enrollments of recent years was arrested only last September, and that NSF is working with engineering societies and with the Junior Engineers Technical Society in trying to develop interest in engineering on the part of high school students.

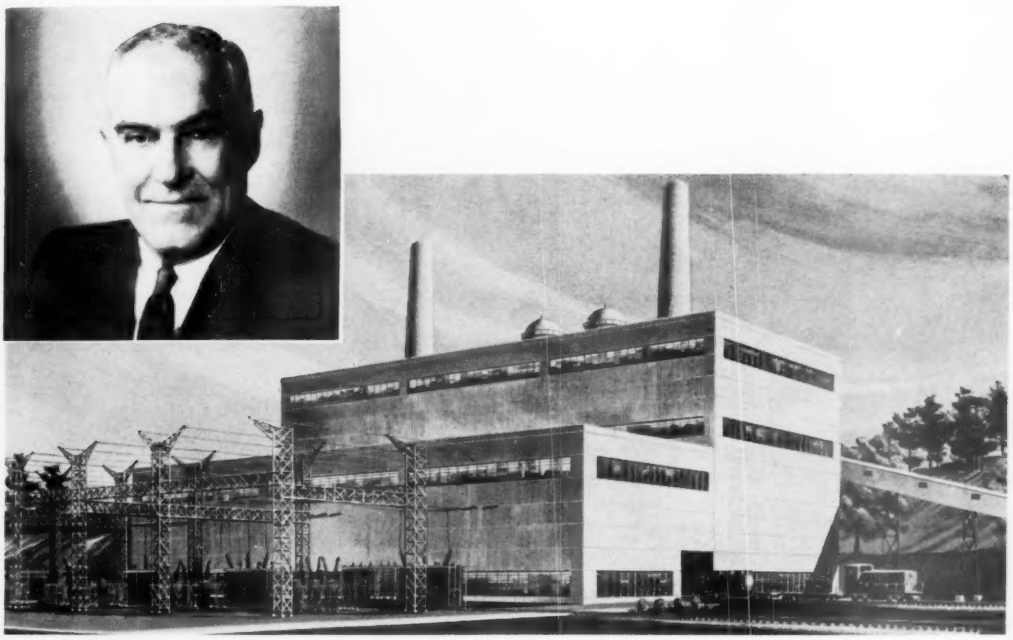
The Committee also recommended that NSF should take the initiative to determine the needs of other Government agencies for basic research. The Committee added that the NSF budget request of $277 million for fiscal 1962 should be considered "minimal in recognition of the need to broaden our research base in this era of technological warfare." However, the final Congressional action cut this to $263,250,000.

Budget Bureau Investigations ►

The President has directed the Bureau of the Budget to give him a report by December 1 on various aspects and the desirability of the Federal Government making extensive use of contracts with private institutions and enterprises to provide for the operation and management of research and development facilities and programs, analytical studies and advisory services, technical supervisions of weapon systems and other programs administered on a systems basis. The Chief Executive said that the use of such contracts had resulted in accomplishment of scientific and technical work essential to urgent public purposes, and had been made necessary by the Government's entry into such new fields as atomic energy, missile development and space exploration. He noted, however, that there has been recent congressional criticism of this method of operation and some expression of opinion that the work involved should be handled by regular Government employees. Of particular interest in the study will be comments on the President's reference to wanting "full consideration given to the limitations which make direct Federal operations difficult, and to the development of proposals for adjustments and new concepts in direct Federal operations which would provide the Government with greater flexibility in determining whether the public interest would best be served by the use of contractor or direct Government operations." Under the directive the Budget Bureau, with the assistance of other agencies with direct responsibilities for technical programs, will comment on the effect of the use of contractors on direct Federal operations; the policies the Government should follow in controlling the salaries and fringe benefits of contractor personnel; policies on the selection of contractors; Government review and supervision of contractor operations; and policies on fees and cost reimbursement practices on such items as overhead, facilities, equipment and advertising.

The special study will almost surely deal with the classification and pay of the Government's engineering and scientific personnel, compared to those of private contractors and, hopefully, could open the door toward more favorable consideration by the Administration of a separate classification and salary schedule for Federally-employed engineers and scientists.

Professional Profiles



John J. McDonough, P.E., Atlanta, Georgia, still applies to his engineering practice the same vigorous determination and competitive spirit with which he used to play college football.

VIGOROUS and enthusiastic are apt words to describe this month's professional profile personality. As a husky and determined college freshman, he went out for football at Georgia Tech. His determination and competitive spirit soon led the coach to name him the team's quarterback.

Today, John J. McDonough, P. E., is still calling the signals, but now as president of one of the leading investor-owned electric utilities in the Nation. The qualities that carried him through many formidable moments on the gridiron are still with him as president of the Georgia Power Company.

One of his top engineers puts it this way: "He has the knack of instilling in those working around him a dynamic outlook and a positive attitude for getting things done. He continually encourages his engineers neither to fear the future nor scorn the past. His enthusiasm is contagious."

Today, the Georgia Power Co. is the Nation's tenth largest investor-owned electric utility on the basis of load capabilities, and in the next twenty years it is expected to grow at a rate well ahead of national averages.

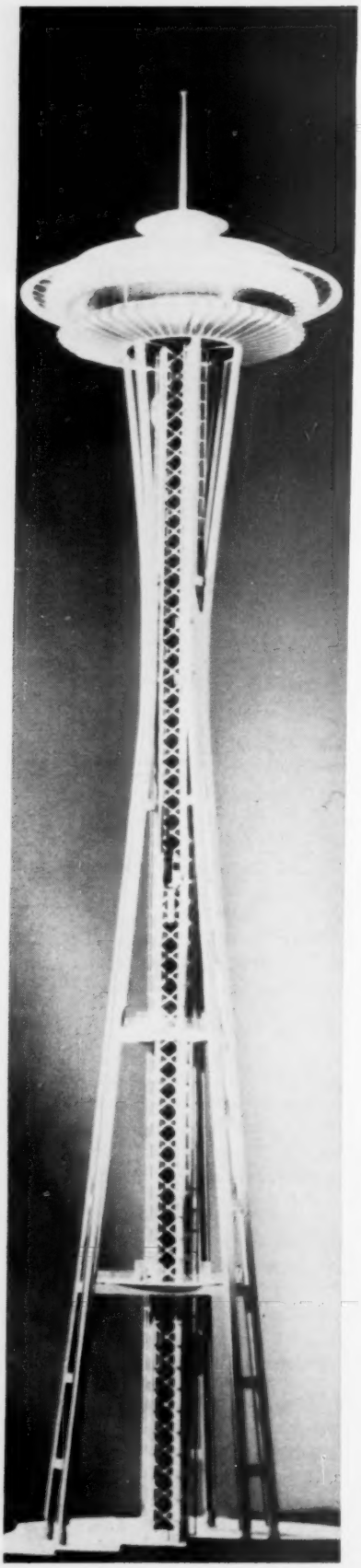
One outgrowth of McDonough's progressive leadership has been the pioneering effort by his company in nuclear reactor engineering. In 1958, after an intensive 52-week training period, the Georgia Power Company graduated the first class of this kind ever given by an electric utility.

Born in Savannah, McDonough received his B.S. in mechanical engineering from Georgia Tech in 1923. He then served as athletic coach and teacher of mathematics at Savannah High School until 1927. In that year he began his career in the electric utility field with the Georgia Southern Company, a predecessor of the Georgia Power Co.

He served the Georgia Power Company in various managerial and supervisory capacities throughout the state until his election as a vice president in 1940. In 1950, he was transferred to Atlanta as vice president and manager of the Atlanta division. In the following year he was elected executive vice president, and became president of the company in 1957.

Recently, two tributes accorded to McDonough testified to the high esteem in which his associates hold him. Last December, he was nominated by the Georgia Society of Professional Engineers to be the 1961 National Engineer of the Year. He was the first native Georgian to be nominated for this award.

Then, as a fitting climax to his more than 30 years' service to the electric utility industry, his company's board of directors voted to name a 500,000 KW. steam-electric generating plant, now under construction, in his honor. When completed in 1964, Plant McDonough will be one of the most modern and efficient generating plants in the South.



Science, Engineering—World's Fair Highlights

For the connoisseur of the colossal, the future is rosy indeed. Not one, but two world's fairs are in the immediate offing within the next few years, and whether the panoramaphile lives on the East Coast or on the West Coast, there will be one nearby.

In a modernistic office building in Seattle, Washington, there is a rather unusual console, looking somehow appropriately like a slot machine without the lever. This device is clicking off the seconds between the present and a $70-million jackpot—Seattle's Century 21 Worlds Fair, due to open in the spring of 1962.

At the other end of the Nation, an even more spectacular device—in the form of Robert Moses—is providing preliminary fireworks for the $1-billion New York World's Fair, set for two seasons, in 1964 and 1965.

For the public, these two fairs will mean virtually unprecedented opportunity to see exhibits ranging from Rennaissance masterpieces to home appliances from the next century, and scientific displays which will exemplify items ranging from Kepler's Law to how spiders hunt.

The fairs will generate a plethora of publicity and promotion, and will provide an introduction for many people to a great number of natural and man-made wonders of the world.

For the engineering profession—and thus the individual engineer—these world fairs have indirect, but nonetheless important, implications.

First of all, there is obviously a large amount of engineering needed simply to get anything as large as a world's fair on the road. For instance, Fred Christianson, P.E., staff engineer for Seattle's Century 21, estimates something over a million dollars will be spent on engineering services for the fair. In Seattle, the policy will be the same as that stated by New York Fair President Robert Moses: "There will be only a small, well paid, central planning and operating force. All work which can be performed off the premises will be done by contract with competent consulting engineers, architects and others. . . ."

Because the Seattle fair is only a year away, most of the contracts

Space Needle, left, will provide the theme for the Century 21 Exposition in Seattle next year. During this year's annual meeting, many who attended went out to see this world's fair in its building stage. Right, NSPE President Murray Wilson, Century 21 engineer Fred Christianson, A. H. Samborn and AE Editor Kenneth Trombley compare blueprints and construction on the 74-acre site. At far right, construction on the Century 21 Coliseum progresses. The mammoth building will be roofed with aluminum.

involved are already signed. While there is more opportunity in this respect for the later New York fair, the volume of business available is not really as interesting as the unusual nature of the engineering work involved, and the opportunity it provides for handling projects that are certainly far from being run-of-the-mill.

For instance: The Space Needle which will provide the theme for Century 21. It's unlikely that there are many engineers around who have had experience building revolving restaurants atop 550-ft. towers. Yet this is exactly what is being done in Seattle. With the exception of Disneyland, there are few places where experience with monorail construction and transportation can be had, short of a world's fair such as Century 21.

From an engineering-work standpoint, the most important aspect of the fairs is in their experimental nature. The freedom that is allowed to the engineer and the designer, by the nature of the fair itself, is probably unique to this sort of a project. By definition, Century 21 is looking into the designs and engineering techniques that will be used in the future. While all engineering work involved will, of course, be controlled by existing engineering specifications, there is ample room for imagination and creativity. An indication of this lies in the materials that will be used for the Seattle Fair. Wood laminates, pre-stressed concrete shells and aluminum roofing are a few. While none of these materials are actually new, they have found relatively limited use at present. The point is that in a project that is admittedly futuristic in scope, such materials are much more likely to be used than in normal, day-to-day construction and engineering.

Probably the major effect of the two fairs will not be in terms of available work, or technical innovation, or career opportunities. Taking a wider view of the New York and Seattle fairs, the benefits that stand to be gained by the engineering profession—as a profession—far outweigh any of the foregoing. This is true because in both cases, broad segments of the public—estimated close to 100-million—will view the two fairs during the three years they will be operating.

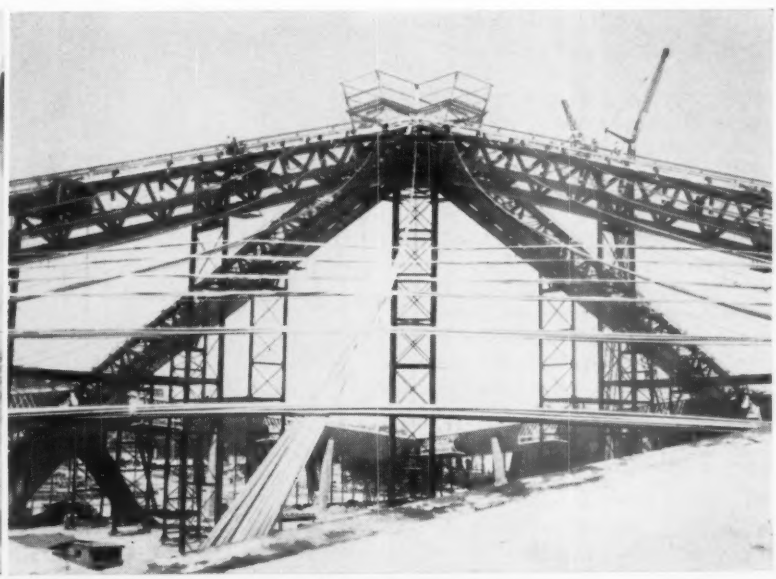
This provides a literally unprecedented opportunity for the engineering profession to make contact with the public, to explain its precise function, and to display and interpret its truly outstanding contributions to the public welfare. This will, of course, be done primarily through industrial displays which will hinge on engineering progress. One example of this is the proposed Coca-Cola exhibit at the New York Fair, which will consist of a highly advanced, fully automated bottling plant open to the public. In Seattle, American Telephone and Telegraph will have one of the largest displays, in all likelihood covering the use of satellites and space engineering and their uses in communications of the future.

For generating interest in science and engineering among young people, there could hardly be imagined a more sweeping opportunity. As surely as science and engineering are vital to the progress of industry, society and man himself, so surely will science and engineering provide a recurrent theme throughout both fairs. Although it is primarily aimed at pure science rather than engineering, probably the best example of this focus will be the U.S. Science Pavilion at the Century 21 Exposition.

Proposed as a seven-building complex, the U.S. Science Pavilion will have the stated aim of (1) presenting the role of man in his search for truth in science, and (2) stimulating the interest of youth in science. To do this, the seven-part pavilion will include:

(1) The House of Science—a film that will introduce and explain the general philosophy of all science. This will be projected from seven synchronized projectors, a system designed by Charles Eames.

(2) Development of Science—exhibits which will show the evolution of science from man's earliest



curiosity about nature, through to his developing the tools for present day research, including such advanced techniques as electronic microscopy.

(3) A Spacearium—similar to a planetarium, this section will simulate a two-billion light year ride through space in about ten minutes. With the aim of indicating the immensity of space, the Spacearium is as realistic as is technically possible.

(4) Methods of Science – six areas of science will be covered, showing what work is currently being done in these areas.

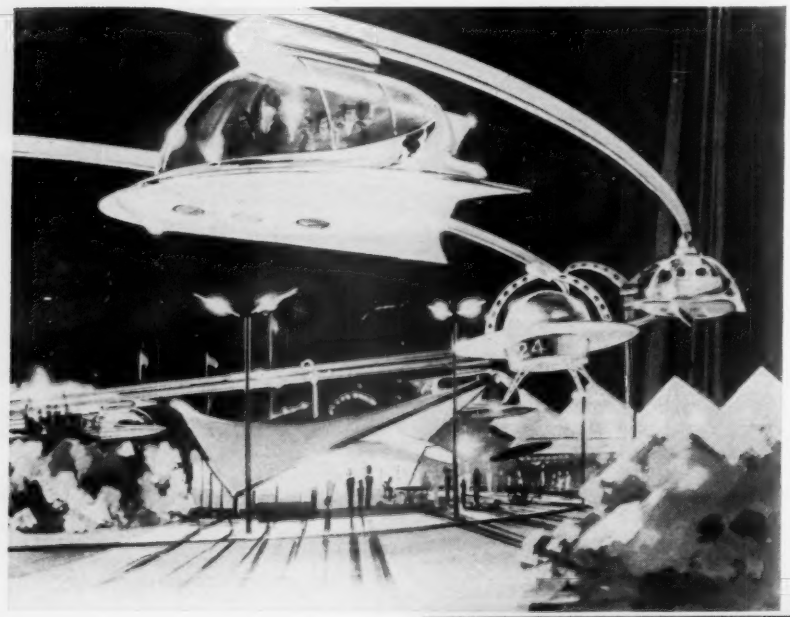
(5) Horizons of Science—this exhibit will attempt to put the foregoing areas into their proper perspective in terms of the individual, world population, and man's place and responsibilities in an increasingly scientific and technological world.

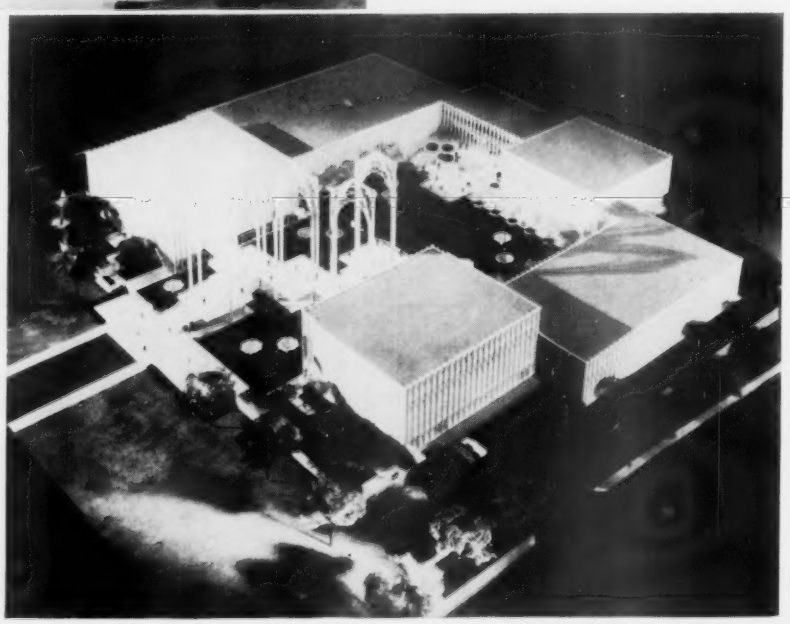
(6) Area six is essentially a young's people's laboratory, in which simple experiments can be performed by those who wish to participate. The experiments available range from the extremely simple to the moderately complex.

(7) The last area of the pavilion is a science theater, which will consist of a small auditorium for motion pictures on science and lectures and demonstrations covering a variety of related subjects.

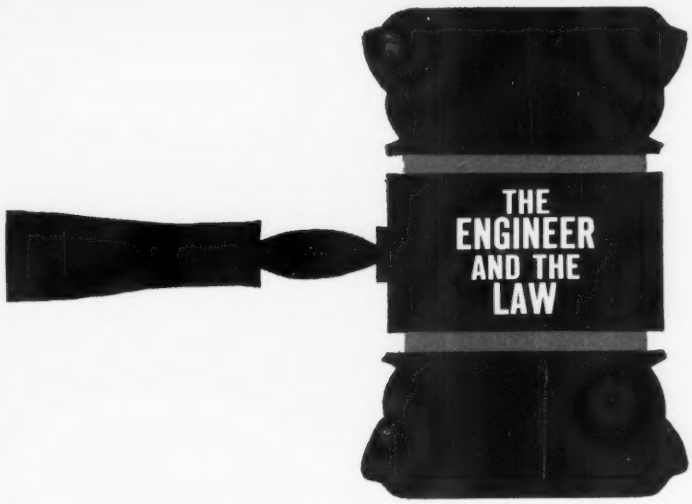
While this exhibit is specifically directed to the generation of scientific interest among young people, it is only one part of one of the two fairs. If all other displays do not have this specific goal—which they naturally don't—there will still be ample material available at both fairs for the youngster who has an interest in engineering or science. There will also be ample material to spur such an interest, both for the child and for the adult who attends either of the fairs.

It is significant that the theme for the Seattle World's Fair is man in the twenty-first century, for both fairs may well contribute to the improvements they may have in mind in their look into the future. Engineering and science will make these improvements possible, and by constructively stimulating the interest of youngsters and adults alike in these subjects, the way can be paved for new ideas, new attitudes, and new understanding of what the world's bursting technology is all about.—**End.**





Both fun and education will play parts in the Seattle World's Fair. Top, an on-site monorail will transport visitors around the fair grounds. At the right, this model represents the U.S. Science Pavilion. This nine part exhibit will be one of the major sections of the Seattle Fair. It will serve both to provide entertainment to those attending, and to educate on what the world of science is all about. One highlight within the pavilion will be a do-it-yourself laboratory for children.



Problems of Fee Schedules and Anti-Trust Laws Have Implications for Engineers

THE legality of recommended or suggested minimum fee schedules for professional services is again a matter of current interest and agitation. Recently the Northern California Pharmaceutical Association and its past president were convicted of criminal violation of the Federal Anti-Trust Law (Sherman Act) for promulgating and adhering to a Suggested Prescription Pricing Schedule for noncompounded prescriptions. The American Pharmaceutical Association has vowed that it will carry the case to the Supreme Court, if necessary, to vindicate the professional status of pharmacists and, by inference, a consequent right to use a pricing schedule.

It is apparently assumed that if professional status is established there is an automatic immunity from the anti-trust laws. In fact, the presiding judge at the trial, Chief Judge Louis E. Goodman, declared: "There is an immunization under the statute (Sherman Act) for professional services . . . (and) if what these pharmacists do is entirely a matter of professional service, why I think the court should keep hands off of it." But here Judge Goodman is stating a conclusion of law which the Supreme Court has not declared. In its 1950 decision in the Real Estate Board Case the Supreme Court specifically stated that it was not intimating any opinion on the application of the anti-trust law to the professions. It is true that many years ago the famed Justice Story made a distinction between the professions and those in "trade," (the Sherman Act applies to "restraint of trade or commerce") but more recent Supreme Court decisions have cast doubt on the soundness of that distinction.

What has aroused the ire of the pharmacists particularly is Judge Goodman's rejection of the defense that the pharmacists were engaged in rendering a professional service. "But I don't think that any experts would convince me that this is a professional service. A prescription is only a piece of paper . . . that requires no more professional service from the druggist than putting it in the package and delivering it," he commented. If the "professional" aspect should turn out to be a significant one, it is important for the engineering profession to note some basic distinctions between consulting engineering and the dispensing of drugs. First, the Government's complaint makes the point that over 95 per cent of all drugs used to fill prescriptions in Northern California are precompounded (compounded by a drug manufacturer, purchased by pharmacists and used by them to fill prescriptions without any additional compounding). Obviously, this condition does not apply to the preparation of plans and specifications which, except in rare cases, are one of a kind and individually tailored for a single project. Secondly, most of the drugs were manufactured outside the state and shipped in interstate commerce to the point of destination. Again, the situation is not analogous to the handling of engineering plans, although these too are sometimes sent across state lines from the place of actual preparation. The judge completely rejected the defense of professional status based on the fact that the state regulates the practice of pharmacy and has declared it a profession. He said that this fact had no significance because the gist of the druggists operation was the sale of a commodity, as distinguished from the sale of a service. On this point the engineering profession may have to argue one day whether the preparation of engineering plans for a fee is the sale of a service or the sale of a commodity (blueprints, specifications).

An interesting side note of some relevance to the engineering profession was Judge Goodman's charge to the jury: ". . . The pharmacists employed by the drugstore owners are employed on salaries, they do not receive professional fees, they are mmbers of the unions, their salaries are fixed, as are all drugstore employees, by collective bargaining agreements, and so the question of so-called professional fees of pharmacists which they do not receive is not involved in this case and is not a matter for your consideration."

Just what this language is intended to convey is not too clear, but there is implicit in it a feeling that there is an obvious inconsistency between collective bargaining by employees claiming professional status under a state licensing law and true professional status. It would be surprising if the Judge meant that a professional practitioner loses his professional status by virtue of having professional employees, because he had no question about the professional status of doctors and lawyers in another part of his statement and they, too, more often than not employ professionally qualified assistants.

Over and above the question of

(Continued on page 64)

NATO MWDP and the P. E.

International cooperation, minimum investment, and top engineering talent are paying heavy dividends for the North Atlantic Treaty Organization. This is the story . . .

With all of Europe on the griddle, and Berlin simmering close to the boiling point, it is hardly surprising that the North Atlantic Treaty Organization is more and more in the public eye, both as a focal point of European politics and as a symbol of the military strength of the Free World.

But as is often the case, heavy emphasis on the purely military nature of NATO has tended to overshadow other aspects of that alliance which are only slightly less important than the number of troops it could muster in case of war.

Certainly, in today's technological age, the soldier on the battlefield is only as good as the weapons he has to use, and perhaps to an even greater degree, this is true of the Navy man or the Air Force pilot. It is hardly surprising, then, that the NATO organization includes a number of provisions for the development of more effective weapons for the NATO soldier. Given the marked success of these programs, what is surprising is that they have received such meager attention in the past.

This lack of attention is even more surprising when it becomes clear that these programs are actually saving the United States money and providing measurable improvements in the arms of the United States. The foundation from which these U.S. benefits have grown is the Mutual Weapons Development Program, known as MWDP.

Although MWDP is formally administered by the Pentagon, it is nonetheless a program in which participating nations actually participate, in terms of money, ideas and technical ability. On the average project, American dollars represent only about 36 per cent of the total cost. When this is measured against benefits the U.S. has received through the program, it begins to look like a more than reasonable method of doing business.

Aside from the high degree of immediate engineering work that is involved in each of the MWDP projects, there are two broader—and in the long run more significant—implications for the engineering profession. First MWDP has turned into an extremely successful experiment in international technical cooperation. Second, the work handled by MWDP, because of its vital nature in today's uneasy world, has shown that the engineering profession can join in cooperation to meet a challenge that could plainly affect the entire world.

A real International hybrid is the Fiat G-91, shown on an Italian flight line here. A joint development venture from the beginning, this plane drew on the technological knowledge of England, France and Italy.

In service with the Italian Air Force are these and other Fiat G-91 jet aircraft. Developed under the Mutual Weapons Development Program, these planes can take off from the crudest of unimproved airstrips, handle a wide range of military tasks.

On the first point, probably the most striking example is a technical data exchange program, initiated under the last Administration in 1957 as a result of President Eisenhower's pledge to U. S. allies to make available more research and development information. MWDP did much to make this program effective. Under MWDP Mutual Data Exchange agreements, project directors from the U.S. and the particular NATO nation involved communicate directly with each other, and exchange visits regarding specified technical matters of mutual interest. At this writing, some four hundred such agreements have been signed, and many more are in the process of negotiation.

While no engineer can operate effectively without adequate technical information, the above program is primarily administrative. And again, in many cases it has been more a case of the U. S. drawing on the knowledge of other nations than the other way around. Where rightly or wrongly many "mutual" aid programs have appeared to be simply giveaways on the part of the U. S., MWDP stands out as a program in which this country has come out well ahead on its investment—and has the hardware to prove it.

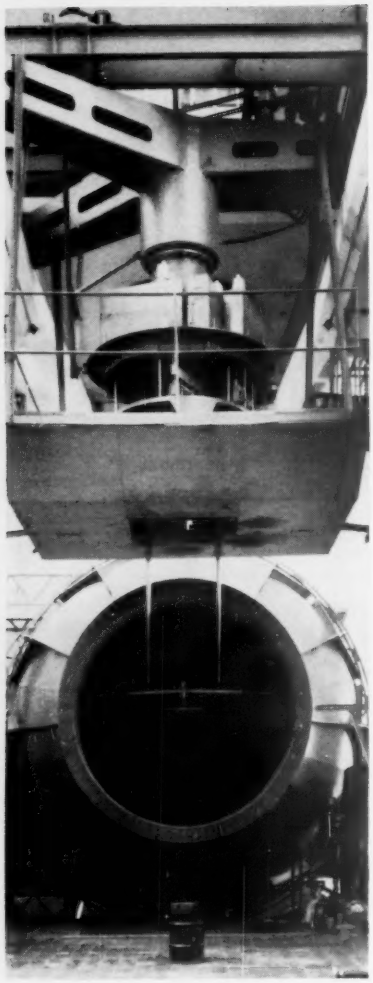
Perhaps the best example of this is a French contribution, the SS-11 anti-tank wire-guided missile. At the time the U. S. was working on its own DART anti-tank missile, also a wire-guided weapon, the French had developed the SS-10. Perhaps because it had had an earlier start, the French project beat out the U. S. program in time, cost and reliability. The program looked good to the U. S., but there were certain problems—particularly that the French weapon, although farther down the road of development, lacked what U.S. engineers felt to be sufficient punch.

The outcome was that France turned to MWDP to get the funds to develop the more powerful SS-11, and saved this country the expense of going through a full development program on the DART. The culmination of this cooperation was when President Eisenhower attended a demonstration of the SS-11 at Fort Benning, Ga., and saw it score three out of four hits on a tank-type target at ranges measured in miles. President Eisenhower's comment was direct and to the point: "Wow!"

Other examples of the effectiveness of the MWDP program are equally striking. For instance, a Norwegian development program for a small, but accurate, anti-submarine warfare detection-and-kill device. The basic problem leading to this program was that the Norwegians, like many other European countries, were faced with the threat of Russia's 400-plus submarine fleet, and yet lacked naval vessels large enough to make use of existing ASW (anti-submarine warfare) equipment. The need, then, was for a sonar/computer/kill system that was significantly smaller than anything around at the time. Because it had larger ships, the U. S. rather obviously had limited interest in footing the bill for the whole program—for the U. S. alone, with U. S. funds, the program was simply too marginal to be worth-while. However, it was clearly in the interest of the U. S. to have a strong naval force in NATO.

Here, MWDP came into the picture. Partial funding on the part of the U. S., plus making U. S. engineering facilities available to the Norwegians, paved the way for development of the Terne III, and ASW system small enough to be carried on a ship of a scant 500 tons. The final balance sheet showed the U. S. had put up barely a fourth of the cost of the development program, while materially improving the defenses of Norway, and in turn NATO, and in turn the Free World.

One more example: NATO military planners early came to the conclusion that, in the event of war, military bases in Western Europe would be hit hard and soon, particularly landing fields for aircraft. The requirement that was dictated was an engineer's nightmare: Build an airplane to



Joint international use of elaborate facilities such as this wind tunnel is typical of the Mutual Weapons Development Program, and the three technical Centers which are operating in conjunction with MWDP.

compete with Communist jets, and still able to take off from unimproved runway areas—even a pasture if necessary. A big job, and one that took the cooperation of three nations—Britain, France and Italy—to solve. The result was the Fiat G-91, a small, light aircraft that handily fills the needs as stated.

If the three foregoing examples are among the most spectacular instances of the success of MWDP, what of the failures? It is a fair compliment to the careful planning and administration that have gone into MWDP that there have been very few unsuccessful programs—something on the order of ten per cent of those initiated. A recent accounting showed that of 33 original projects under the program, 25 had been completed; four were still progressing successfully; and only four had been terminated for any reason.

The reason for this high ratio of achievement almost certainly lies in the tremendously minute screening through which any project seeking MWDP funds must pass. Before a project can even begin to be considered, it must meet three exclusive criteria, each of which is aimed at making the investment eventually pay dividends.

First, the project must be directed to the fulfillment of an operational requirement or target of high priority specified by an appropriate operational military staff. Second, the development item in question must be sufficiently advanced in design to insure a marked improvement over standard items available to the country of origin and, if successful, to give good promise of materially increasing the effectiveness of Free World forces. Third, the projects must be of such a nature that technical and financial aid will make it possible to speed their completion.

Thus, before a proposal can even be considered, it must have a market within the country that is doing the work, as well as NATO. It must be a significant scientific or engineering advance, and it must be well enough along so that money or added information can demonstrably speed it up. It is significant in this light, that the nation sponsoring the project usually spends about a third of the total cost of the project before MWDP even enters the picture.

And this is only the beginning of the screening process. It is at this point that the U.S., as a possible source of money or information, steps in and asks, in effect, "Is this going to be worth the money you want us to invest?" To answer this question, there begins a seven-step evaluation process that is designed to weed out the projects that don't have enough potential. The effectiveness of this weeding out is best measured by the programs themselves. These are the steps:

(1) A U.S. director of a Mutual Weapons Development Team with technical staffs of the services in the field makes an initial review of the project.

(2) Next screening is done by the U.S. element of Supreme Headquarters, Allied Powers Europe. At this point, NATO military needs are read into the evaluation.

(3) The technical agencies of the military departments in the U.S. analyze and evaluate the projects in the light of over-all service considerations in this country.

(4) The technical staffs of the Office of the Defense Director of Research and Engineering provide an independent analysis and evaluation.

(5) An Advisory Group, composed of outstanding scientists and engineers, technically checks out all proposals, and compares the projects with those within our own military research and engineering programs.

(6) The Office of Foreign Programs within Defense Research and Engineering makes its own evaluation of the proposal, considering previous evaluations, then measures this against the funds available, integrates the proposal within the total MWDP program and submits it to the Director of Defense Research and Engineering, who,

(7) Makes the final decision on technical approval of the program.

If the foregoing seems unnecessarily involved, it is proved out by its own results. Judging by the number of successful projects that have come through MWDP, the screening is effective. As one last note it is worth mentioning that the entire program, project by project, is subject to a continuous and detailed follow-up process to see that progress is satisfactory, and to make sure that aid is available if needed.

THERE is another phase of the MWDP program that will, in the long run, perhaps be more significant than either the exchanging of information or specific hard-

ware programs. This phase consists of the various centers of international cooperation on scientific matters that have been set up under the MWDP umbrella. So far, there are three of them—a training Center for Experimental Aerodynamics, an Air Defense Technical Center, and an Anti-Submarine Warfare Center. The first two of these are multilaterally funded with each participating nation paying its own share of the operating costs. The ASW Center will be on the same basis in the fairly near future.

The Training Center for Experimental Aerodynamics has a three-part statement of its job that is a fair indication of what these groups do. The Center's objectives are: (1) To give scientists and engineers from the NATO countries a specialized training in the techniques and practice of a modern aerodynamics laboratory; (2) to contribute to the dissemination of knowledge in the field of fluid mechanics and, more particularly, of experimental and applied aerodynamics; and (3) to encourage the practice of research work in the field of experimental aerodynamics and fluid mechanics.

Located in Brussels, TCEA offers different benefits to different participating nations. Quoting Director L. H. G. Sterne, "I sincerely believe that the starting up of TCEA . . . was, in fact, an excellent example of enlightened American initiative, designed to help other nations of NATO, but which, in the event, has proved to be of considerable direct advantage to the U.S. itself in helping train a few of its better young engineers in a strictly international atmosphere. . . . The value of the Center to the U.S. is naturally somewhat different from that to the less-developed members of NATO. For engineers from the latter it provides the opportunity to work in up-to-date aerodynamic facilities which just do not exist in these countries. For the American aerodynamicist it provides the specific professional training which is recognized as necessary in most professions. . . ."

The beginnings of the SHAPE Air Defense Technical Center offer perhaps a fair analysis of the need for a program along these lines. E. C. Williams, director of SADTC states the problems this way: "The vulnerability of Europe and of our bases in the area had long been of concern to the United States. . . . Borrowing somewhat from the Lincoln Laboratory concept, the creation of an electronic research organization for the Supreme Headquarters, Allied Powers Europe to study the problem of European Air Defense had been discussed during 1953. The idea grew that a European laboratory along such lines, internationally staffed, might catalyze action in the several countries and lead to the greater integration of NATO air defense. This concept mated ideally with the Mutual Weapons Development Program. . . ."

Although the ASW Center at La Spezia is the youngest of the three technical centers, it is unquestionably doing a full share of work. Its laboratory and a research ship are working, and its convenient location on the Mediterranean—donated rent-free by the Italian Government—has given it a fast start on its vital task. Scientific Director John Ide offers this comment on how the center is coming along: "Scientists from nine participating nations, with the assistance of naval personnel from the NATO ASW forces, are now working harmoniously together to solve technical problems important to ASW. . . ."

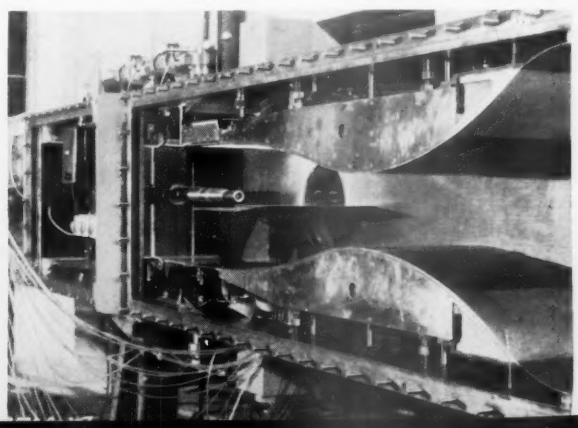
Thus, the result was, again, joint action to meet a joint need—international action to meet problems affecting more than one country.

In summing up the accomplishments of SADTC, Williams perhaps speaks as well for the entire MWDP and the results that have been achieved through this type of cooperative action: "The Center has now been operating for a year as the first internationally financed military research establishment within the North Atlantic Treaty Organization and it seems already that this great experiment in international cooperation, evolved from the funds of the MWDP and nurtured by the National Defense Research Organization of the host country (Belgium), is proving a most valuable contribution to the general military well-being of NATO."—End.

(Illustrations with this article by Photo NATO)

At the Training Center for Experimental Aerodynamics, this water table for supersonic flow analogy is used by the scientists and engineers of all nations participating in the Center. Here, it is set up for transonic operation.

With side panel removed, the test chamber of this supersonic wind-tunnel is visible. This wind tunnel is only a part of the modern and effective laboratory available to engineers working with the Training Center for Experimental Aerodynamics.



Commercialism vs Ethics

By

CHARLES T. CHAVE, P.E.

Chief Engineer, Nuclear Projects Division
Stone and Webster Engineering Corp.

THE title implies that doing business in the usual manner causes difficulty with the practice of professional ethics. Probably this point would never have come up if we had not started to think about professional ethics in engineering to the extent we are thinking about it today. It only arises because some people like to think of engineering as a learned profession rather than a business. I do not mean to suggest that there are no business ethics —there certainly are—but the ethics of a learned profession are something more than one needs to have in conducting merely commercial ventures. For example, practicing as a consulting engineer, one has to have his client's interests at heart, and it is not a proposition of trying to sell a man something and sell for the maximum price, but rather trying to serve his interests for only a reasonable compensation. In this sense it is quite different from, let us say, selling an automobile, where there is a "horse trade" involved in many a sale.

When we talk about ethics, what do we mean? I meet a great many engineers who are terribly confused about this matter, some of them in quite high places. Many college professors, and on one occasion the president of one of our Founder Societies, has said to me, "All I know about ethics is the Golden Rule." This is fine, but it takes rather an involved line of reasoning and abstraction to derive from the Golden Rule some of the specific precepts which professions must accept. For example, practicing doctors never take out patents in medicine. On the other hand, engineers do. You might derive the doctor's position in this from the Golden Rule, but it isn't anything you could do by just sitting down and thinking about it without having talked to any doctors. When I talk about professional ethics I mean the rules of conduct of people in a specific profession, as developed from their peculiar experiences in that profession and which cannot be arrived at directly by believing in the Ten Commandments or, for that matter, the Koran. For another example, all professional ethics have something to say about reasonable compensation. Low compensation will result in poor training and high compensation exceeds the limit of professional decency, and we have to strike some middle ground.

Further with respect to engineering ethics and confusion, the consulting engineer, who comes closest to the doctor or lawyer, and who conducts a strictly individual-to-individual practice, has his own ideas about the subject. On the other hand, the engineer in industry comes up against entirely different problems and in many ways can't go along with the consulting engineer. This conflict is so bad as to make the consulting engineers feel as though they ought to split from the rest of the engineering profession and set up their own private set of rules.

In talking to engineers from all fields of endeavor, it seems to me that I find an underlying dissatisfaction that comes from misgivings about their practice, particularly with regard to ethics. Engineers are trained in school to use their technical skills to solve problems, then when they go to work they get thrown in with human beings. They find that these human beings prevent the reasonable solution of many technical problems. They find themselves often having to pull their punches on correct answers and watch company policy or consider what might please the client even though it's probably not the best thing for him, or to install machinery made by the employer when somebody else's machinery might be better. I really think this is "eating" a lot of engineers, and this is one of the reasons for the continued growth of the professional movement and for the emergence of some consciousness of a need to clarify this question of engineering ethics.

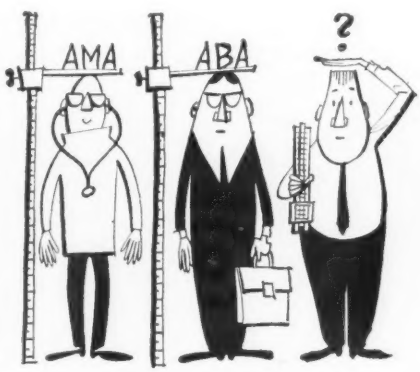
The engineer, however, is in a bad position compared to the doctor or lawyer who practices to serve private clients who come with their personal problems. Engineering is not private but has always been connected with commercial business, the investment of funds and the making of money. We seldom have the situation where something has to be built to save life, and I know of no situation where something has to be constructed to keep people out of jail. In this sense engineering is not as vital as law and medicine. When you are under arrest you simply have to do some-

thing about it, and when you are sick you have to do something about it; but if you need a building or a plant, there is not this same dire compulsion to go into the venture and hire a professional man to tell you what to do. We all buy patent medicine in some form or other, and if we can solve our engineering problems in this manner there is far more temptation than to solve our health problems this way.

Just to show some examples of the difference between engineering and some of the other professions, let us look at one point in medicine and dentistry. As I said before, the codes of ethics of each of these professions state that the practitioner will not take out patents, but that having made an invention he will turn it over to the profession at large. Compare this to the generally accepted homage we pay to the American patent system and to the idea of cooking up new schemes for doing things, new products and new developments, with the object in mind to make an enormous profit. If I were to decry this practice as not being in the interest of society, there are plenty of people who would accuse me of having "pinkish" ideas.

Consider another point: Doctors or lawyers are reluctant to work for corporations, and, if they do work for corporations they cannot practice their profession in the traditional manner. The corporation lawyer usually can't appear before the court; a salaried physician working for a corporation usually can't write prescriptions. Compare this with engineering in which by far the major portion of engineers in this country is employed on a salary basis. Their pay is fixed; they do not charge fees. On the other hand, the doctor's pay is largely fixed by what the medical society prescribes as being reasonable fees; and in this fee schedule may come a certain amount of consideration of the patient's ability to pay, particularly where major illnesses or surgery are involved. It is a little difficult to imagine engineers charging on this basis.

Company policy can sometimes stifle creativity.



Codes of ethics for doctors and lawyers are often more strict.

Which is more, the "extra" added to a lump sum, or the "plus" added to cost?

ANOTHER point to consider in regard to the tenets of both law and medicine is that the patient's or client's welfare is supposed to come first. I don't know too much about legal practice but I believe I do know that in spite of all the shenanigans we may assign to lawyers of the Perry Mason variety, there appears to be strong tradition that the client is to be served with complete loyalty. This also should be a proper tenet for engineers.

I shall select this point as a test point for engineering ethics versus commercialism and see how we get along. One of the first questions where we can apply this test is the matter of contracts. A great many engineering organizations are in both the design and construction fields. There are two ways in which to execute contracts—one, cost-plus, and the other, for a lump sum. These two ways can be mixed up in all kinds of proportions, but they represent the two extreme poles. In doing work cost-plus, the theory is that the client should pay all the costs and that the services of the professional man, representing, let us say, his gross profit, should be negotiated as a percentage of the cost of the work. The idea here is to remove the profit motive from the pursuit of the work and have the engineer's decisions be solely concerned with the client's interests. The removal of the profit motive is not always successful if the fee depends on the ultimate cost of the work, and for this reason fixed fees, based on definitive estimate, are often favored. There is no question that cost-plus contracting has been subject to great abuses to such an extent that it is largely frowned upon by the Government, and it is a subject about which a hue and cry can immediately be aroused in the sensational newspapers.

Nevertheless, a truly professional organization can hardly work on any other basis. By a truly professional organization I mean one which is concerned with building the job for the least money compatible with the quality and results required, and always thinking of the client's business interests. In my experience with cost-plus work I find the dangers come when the cost-plus job is given to a commercially minded organization

which sees a golden opportunity to make an extravagant production out of it with an assured profit. Without professional ethics, cost-plus can be robbery.

However, I think it is too bad that this method of contracting has fallen into disrepute with many people. I think engineers understand it and, in general, the public utility field, which is largely dominated by engineers, operates this way. In the industrial field where the management is apt to be more accounting or legal minded, we see the desire to have plants done lump sum. It has the theoretical advantage, of course, that the price is set in the beginning and, provided there are adequate specifications, there is hope that the quality of the work can be controlled.

Anyone who has done lump sum work realizes the hazards from extras and, at the same time, the doorway to covering up losses through charging plenty for these extras. The prime disadvantage of doing work for a lump sum, as far as the truly professional man is concerned, is that he is continually tempted by a profit motive. If he has to choose between one machine and the other, he may pick the cheaper one, provided he thinks it will last until his responsibility with the plant ends. It is this type of contracting which probably causes the utmost controversy between engineer and client or, let us say in this case, customer, because the professional relationship now changes and becomes a commercial relationship. It is naturally presumed that the seller is going to try to profit at the expense of the buyer, and the buyer will certainly try to get as much as possible from the seller. On complicated projects it is almost impossible to write a sufficiently detailed specification to avoid controversy. You may ask what this has to do with ethics, and I reiterate that it affects the relationship between the professional man and his interest in his client's welfare.

Along with doing work lump sum comes the package design based upon proprietary machinery and processes. We see this situation when a machinery agent has enough accounts to put together a power plant and then goes into so-called consulting engineering in order to round out the picture. We see it on a much larger scale in the case of the great British consortia who have been participating in the British nuclear power plant program. Here we have several manufacturers and one or more consulting engineers combining together to bid for a job and, being successful, to design and construct it. A successful consortium would furnish the machinery made by the participants without making any outside investigations or comparisons. The same practice is followed by American manufacturers in selling power plants abroad, and is more or less general among American chemical engineers in building certain types of chemical process plants and oil refining installations.

Right here we see a very definite problem or dilemma in the case of consulting chemical engineering. The whole chemical industry is based on secrets in the form of processes, equipment, and operating know-how. It is very difficult for a consulting engineer to work for one chemical client and then another without spreading secret information around. This was realized many years ago and, consequently, many engineering organizations in this field have solved the problem by developing their own processes and selling them in the form of plants to chemical companies. These engineering companies are really in cut-throat competition, to the degree that employees of rival companies are afraid to be seen with each other in social gatherings.

Here is a situation so radically different and opposite from that in which, let us say, any civil engineer finds himself that it seems almost impossible to reconcile the viewpoints. I explained it to a consulting engineer from Montreal a few weeks ago. His attitude was that such a way of doing business was one not in the slightest degree involving professional engineers. If we were to adopt his point of view, we would say that no chemical engineers working for engineering companies who sold proprietary process plants could be admitted to the truly professional level. I know many chemical engineers, and they think such sentiments are incomprehensible.

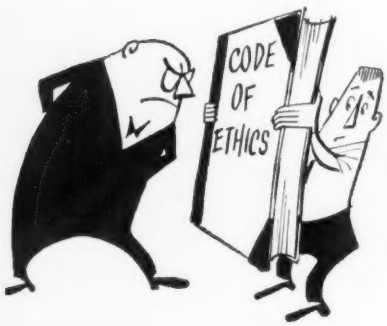
This whole line of argument leads to the sales engineer's problem. In one of the professional engineering organizations to which I belong there are a great many fine engineers who work for manufacturing companies whose sales policy is one of hard selling. If they work for the Smith Machine Company, they might tell you that Smith machines are far and away better than any other machines on the market, and what's more, they believe it. I have had these people chide me for being so utterly and completely stupid as to even con-

Competition makes it a strain for employees of two different firms to mix socially.

Is it ethical for the boss to claim authorship of an employee-written article?

sider such machines as Jones' machines. Here we have a lack of objectivity but usually a perfectly honest one.

Consider your feelings, however, if a doctor were to come and tell you that the medicine he had cooked up on the kitchen stove was far superior to anything on the market, that he was willing to sell it to you for $5 a milliliter, and that if you didn't buy it you should have your head examined. Of course you don't expect the doctor to make medicine, but to know all about medicine and to prescribe what you should take.



An employee who refuses to follow company orders on the grounds of ethics is not apt to last long.

THE question now is how can this sales engineer make himself professional, or is it hopeless to ask him to do so? Do we have to exclude these men from the ranks of top professional engineers because of their commercial interests? I know that some of them have been kind enough to tell me not to buy some of their Smith machines because they didn't happen to have the design which would suit my purpose. I'm not entirely sure how well this would go with a sales department whose function was to sell the company's products wherever they could. Should we train them to resist their own sales departments?

There are many managers who are ethical and objective. Listen to Mr. E. E. Fogle, president of Union Carbide Chemicals Company, who wrote recently in *Industrial and Engineering Chemistry*:

"It is easy to succumb to the lure of the quick sale—the sale that can be made by glorifying the qualities of what one is selling and by disregarding its deficiencies.

"In our industry there exists an obligation, a basic responsibility to be thoroughly honest and forthright in any product we make. Let us stress as strongly as our powers of expression permit us what a product will do for a customer; let us also state with equal candor what it will not do. Avoidance of this responsibility can only harm the customer, tarnish the reputation of the seller, and perhaps deter the development of an entire market. And again the real responsibility devolves upon the individual—no company sells a pound of product—an individual does."

Today there is a great deal of research being performed by commercial companies, some of it for the United States Government. I often have the sneaking suspicion that a great deal of unnecessary work is being carried out so that people can be kept on the pay roll and so that profit can be made. The tendency to do this is generally subconscious. For example, if the research problem involves the investigation of heat transfer with some organic liquid and this investigation is already being made by a competitive company, there is a strong tendency for people to say the other fellow's work is unreliable. Subjectivity seems to creep into this problem at all levels. The idea seems to be to keep the job going. Contrast this with the duty of a lawyer or doctor, which is to work himself out of a job. I can't see how professional engineers can avoid this same view.

Turning to another thought, you all recognize, of course, that the other learned professions, such as law and medicine, spread their knowledge around as much as possible. At a convention of doctors there are a great many papers given in which experiences with patients are related. Doctors get together to exchange and compare notes freely on the treatment of diseases. While the Founder Societies do fairly well in this field, the only organization to which I ever belonged which sounded like AMA, insofar as complete exchange of information was concerned, was a trade association known as the American Gas Association. In this organization people do indeed get up and tell everything they know about their business to everyone else, and the reason for this is simple. There is little competition between gas companies, and they all have a common enemy—electricity. On the other hand, if you were to attend some meetings of chemical engineers you might find that the problems being discussed were not those of the latest important industrial techniques, but rather, the details which had already been made public and which were now being worried to death at the meeting.

Tying in with this question of exchange and spread of knowledge is the question of writing papers. One of the ethical dilemmas the engineering profession has to face is to decide when it is proper to publish a paper for the edification of mankind and when it is proper to suppress the paper because of the commercial interest of the organization who developed the knowledge. In a meeting for the Engineers' Council for Professional

(Continued on page 59)

About the Author . . .

Mr. Chave

Charles T. Chave, P.E., received his B.S. and M.E. from Columbia University and entered the petroleum refinery engineering field, joining his present firm, Stone and Webster Engineering Corp., Boston Mass., in 1939. From 1944-45 he was assistant project engineer on the electromagnetic uranium separation project at Oak Ridge, Tenn., which experience he followed with supervision of petrochemical and natural gas projects. Turning his attention to nuclear power, he became chief engineer of the Nuclear Projects Division in 1956. He is a member of ASME, AIChE, NSPE and ANS, and is licensed in eight states to practice engineering.

Purdue Professor Studies The Impact of Unions on Professional Engineering

The Impact of the Professional Engineering Union, by Richard E. Walton, associate professor of industrial management, Purdue University, published by Division of Research, Graduate School of Business Administration, Harvard University.

PROFESSOR Walton's scholarly and objective work may, inadvertently, be something of an anti-climax to the struggle of the past fifteen years over collective bargaining by engineers in industry. It was written before the demise of several of the larger engineering unions and the subsequent collapse of the Engineers and Scientists of America, a federation of the engineering unions. Although the book thus appears at a time when engineering unionism is at its lowest ebb, it is a valuable reference of historical significance.

The author points out correctly that literature in this area of engineering activity has largely been devoted to the pros and cons of unionization, with relatively little study having been given to the actual detailed experiences of the engineering unions in their collective bargaining relationships with employers. This gap has now been closed in considerable detail, dealing with the efforts of the unions to cope with problems of salary adjustments, overtime, fringe benefits, patent rights, working conditions, merit review procedures, rating plans and layoff procedures, seniority, discipline and discharge, grievances, and jurisdictional issues.

Eleven companies where engineers had organized certified bargaining units were studied, all of them relatively large, primarily in the instrument, electronics, electrical equipment, aircraft and petroleum industries. Most of the engineers and scientists involved in the study were in research and development work. Understandably, but unfortunately from the standpoint of the reader, neither company nor union names are given in reciting actual experiences and statements of viewpoint. Those who have followed engineering unionization developments, however, will be able to identify both in a number of specific situations.

Out of his extensive studies and discussions with engineers (both unionized and nonunionized) and management Professor Walton concludes that most of the engineers in unionized companies themselves have mixed feelings about unions, "but they all share the feeling that unionism is an uncomfortable solution at best." He adds that the chief source of the discomfort "is the lack of compatability between the engineers' concept of unionism and their concept of professionalism. As long as this incompatability exists in the minds of engineers, unionization, whatever form it actually takes, will represent not only a problem for management, but a less than satisfactory solution for the engineers."

While this conclusion is comforting to those who have maintained through the struggle that the basic issue was professionalism versus unionism, the author is not sparing of criticism of management policies and procedures which have caused employee dissatisfaction and were the cause of the original development of the collective bargaining idea as the only available alternative. The management-oriented reader will want to pay special attention to the comments on organizational mechanisms to deal with engineers' problems and selection of personnel to deal with the engineering staff. Professor Walton appears to make the assumption, however, that the removal of management hostility to the engineering unions could help guide the aspirations of the unionized engineers and their organization along more professional lines and away from the traditional pressure tactics which are characteristic of trade unions. The experience of recent years does not indicate the validity of this assumption; in fact, the engineering unions in companies which were either tolerant or neutral in their attitude often were those which moved steadily toward greater degrees of hostility and militancy in their collective bargaining dealings.

Few readers will disagree with Professor Walton's thought that "the professionals in industry have a basic urge to influence their working environment." But not all will concur that "the chain of command which links the managers and the engineers in the large engineering department probably cannot accommodate this urge," because "that linkage system is primarily designed to handle the downward flow of authority."

It might be pointed out that the problem is not in "authority." That must always remain with management under our system. It is rather with "communication"—both up and down. The author recognizes that point, noting in several places ways and means by which the unions have served to improve communications and in the statement that "engineers in

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Let's Change Preventives

. . . to Incentives

By
JOHN F. CAVANAGH, P.E.
Smithfield, Rhode Island

CREATIVE thinking is represented by our industrial progress. It follows that all jobs associated with industry find their grass roots in the applied ingenuity of inventors. Our forefathers obviously appreciated the value of inventive thought in writing that portion of the Constitution which establishes the Patent Office.

Throughout our early history and up to the inception of the mass production era, the exercise of inventive thought was, generally speaking, rewarding. A citizen after developing a needed tool, device, or improvement on existing mechanism could explain the results of his efforts to a local patent attorney and within a few months, barring the results of the preliminary search, obtain patent protection.

The cost of such procedure was, on the average, one hundred and fifty dollars. The inventor could then sell his patent outright, enter into a royalty agreement or, as frequently happened, start a small facility for the manufacture of the item. The latter course has constituted the foundation of many large enterprises in all parts of our Nation, resulting in the creation of millions of jobs.

Rarely, if ever, in these days do we hear of an obscure inventor perfecting some needed item and after obtaining valid patent protection, starting a factory. Our industrial set-up has created within itself, conditions which tend to retard the exercise of the very functions which gave it birth. The American patent system, on the whole, has developed into an institution heavily favoring corporate interests as opposed to providing incentives for the individual inventor.

After considering some of the many obstacles confronting present day inventors, it is the purpose of this discussion to propose means whereby our government, without resorting to practices savoring of prize awards, may provide practical incentives for the exercise of inventive thought in every branch of industry.

Inventive ability and business acumen are characteristics seldom present in one person. They are separate gifts which become effective in proportion to the intensity with which they are exercised.

Some corporate interests never have been indifferent to the opportunities for aggrandizement and employed inventors have become their legitimate prey. Seldom does the relationship approach an equality of bargaining positions, hence with paternalistic mien and with the aid of unethical legal counsel, an inventor is sometimes brutally exploited.

A rather harsh indictment but a lifetime spent in intimate contact with inventors and creative minded persons attests its validity. While a volume could be written on the subject of exploitation of inventors, let us for the present cite a few examples right off the record.

A concern manufacturing a widely utilized commodity wished to develop advanced features and accordingly advertised extensively for creative talent. Applicants were carefully screened and holders of records of successful work in the particular field were from time to time hired upon condition they sign a rigid and sweeping employment agreement affecting creative work. A clause prevented the employee from engaging in competitive work within two years after quitting the concern for any cause whatever.

After hiring, frequent conferences were held affecting improvements in design and search for new items. A notary and a professional secretary attended every meeting and complete records were kept of everything that transpired. Within a short period of time the newcomer finds he is no longer wanted and is forced to seek a new connection under the handicap of the agreement. In these premises inventive talent has become a liability and security goes out the window.

Several concerns in an eastern city have found it expedient to have one member of the company sign all patent applications under the pretext that it is "all going into the same pot." The real inventors are, however, well treated if they continue to produce and they have a measure of security, but obviously the law is repeatedly violated.

Frequently an employed inventor finds himself at the mercy of an executive totally unqualified to supervise creative work. Having no background of technical experience and possessing a meager education. such an executive endeavors to establish the preposterous notion

that asserting the obvious or stating the problem constitutes invention and in these premises he is master-minding the progress of inventive effort in the concern. In such circumstances the going is rough and the abuses common.

A pernicious practice common in many large plants consists of demanding frequent reports from each individual, hired for creative work, affecting his efforts to uncover new devices and improvements of existing items. It is required that the results of such creative work be entered in a book, reserved for the purpose, and be in the form of sketches and descriptions. Such entries are dated and sealed by a notary public. At some future date, perhaps after the inventor has been discharged, a project is selected from the records and carried to completion by one or more persons picked by the executive at the head of the department.

In the event a present day inventor is able to develop an item under circumstances free from tricky employment agreements, his path is thornier than would be that of his forefathers. To begin, he must have available, in cash, from three to four hundred dollars to meet patent expenses for the simplest device and expenses mount sharply for more involved items.

Very frequently such a person falls prey to unscrupulous patent solicitors who find easy picking in an area represented by inexperienced inventors and numerous artificial legal services, such as needless personal conferences with patent examiners in Washington, each "service" carrying a nominal charge. As for preparation of the patent application including even the drawing of claims, it is common practice to farm the work out to law students.

A corporation, on the other hand, engages only reputable patent counsel while a poor inventor frequently selects his patent solicitor from among the high pressure ads in popular magazines.

IT is singular that the government of a nation which owes its industrial supremacy to its inventors has never seemed to recognize creative work as the function of an individual and as such endeavor to stimulate it by providing incentives.

Partly from personal experiences and mostly through close contact with thousands of practical inventors, I feel qualified to identify the principal present day deterrents to greatly enhanced inventive effort and to suggest government action which would greatly alleviate the situation and most important, direct a great deal of competent inventive talent into channels making for more jobs.

Competent research authorities assert that but two per cent of issued patents are of any economic value. If we exclude from this group the large proportion of patents resulting from professional effort within the corporations, it would seem that the chances of an independent or self-employed inventor obtaining a worthwhile patent are slim indeed. A superficial glance at this situation, however, is misleading. The results of careful attention to the *Patent Office Gazette* and contacts with numerous free lance experimenters prove that much competent inventive ability is misdirected rather than crack-pot. In other words, the inexperienced or ill informed inventor usually applies his talent with but one object in view, mechanical workability, and absorbed in this effort, becomes oblivious to even elementary economic considerations.

Should such a person have access to qualified talent, ready to render unbiased opinions of the economic value of a perfected device or mechanism, before expending time and money in patent procedure, we could expect a vast reduction in the number of "paper patents" and a corresponding increase in valuable inventive effort.

In these circumstances I would class availability of competent economic advice, number one, among the proposed incentives.

The safeguarding of inexperienced inventors from exploitation by unscrupulous patent solicitors, I would consider of great importance.

Thirdly, and perhaps most appealing to inventors generally would be availability of government loans to meet all patent charges for approved inventions.

In order to implement the incentives outlined in the foregoing, a board would be instituted consisting of industrialists, engineers and patent experts of recognized experience and reputation, and organized to expeditiously function in the manner explained in the following example: Let it be supposed that a person has developed means for rendering automobile ignition systems tamper-proof, as protection against automobile thieves, and wishes to obtain patent protections for his invention. After obtaining the rules of procedure, he formally presents the results of his work to the board, much as he would to a patent solicitor. The initial examination reveals merit and intimates that a novelty search of patent files is advisable. This in turn is performed by patent office personnel who report in due time to the board.

In a final conference, with the results of the search and such economic considerations as qualified members of the board are able to present, the board renders a decision.

If favorable, a formal order for solicitor services is issued for the benefit of the inventor, said order being confined to a solicitor in the general locality of the residence of the inventor.

The patent, when eventually issued, would carry a government

(Continued on page 58)

About the Author . . .

Mr. Cavanagh

John F. Cavanagh, P.E., has worked all his life as an employed inventor and has had issued over one hundred patents affecting special machinery, processes, tools and electrical devices. A former director of the Rhode Island Society of Professional Engineers, he has written many articles for technical publications. Many of his early inventions were related to automobile ignition and lighting, while in later years he invented the Bostitch stapling hammer and tacker.

Report on a Case by the Board of Ethical Review

The Board of Ethical Review was established to provide service to the membership of the NSPE by rendering impartial opinions pertaining to the interpretation of adopted Canons of Ethics and Statements of Policy regarding professional conduct. The *American Engineer* will print findings on specific cases as they are reported by the BER to the NSPE Board of Directors.

Case No. 60-9

Subject:

Gifts—Section 8—Canons of Ethics; Section 9—Canons of Ethics; Section 16—Canons of Ethics; Rule 1—Rules of Professional Conduct; Rule 4—Rules of Professional Conduct; Rule 29—Rules of Professional Conduct.

Facts:

The following situations are consolidated into one case because they involve the same ethical principles:

Situation "A"—A consulting engineer who has done considerable work for a public body makes it a practice to take certain staff engineering employees of the agency to lunch or dinner three or four times a year, at an average cost of $5 per person. He also makes it a practice to give certain members of the engineering staff Christmas presents at an average cost of $10 each.

Situation "B"—Certain engineering employees of an industrial firm, who are in a position to recommend for or against the purchase of products used by the company, regularly receive cash gifts ranging from $25 to $100 from salesmen for particular products.

Situation "C"—Upon completion of a major engineering contract held by a consulting engineer, the chief engineer of the client who worked directly and intimately with the consultant receives a new automobile of the value of approximately $4,000 from the consultant with a letter stating that the gift is in appreciation of his close and friendly cooperation and assistance in the successful performance of the work.

Questions:

1. Was it ethical for the engineers in the above instances to offer any of the gifts to the employees?
2. Was it ethical for the engineers in the above instances to accept any of the gifts tendered them?

References:

Canons of Ethics—Section 8—"The engineer will act in professional matters for each client or employer as a faithful agent or trustee."

Section 9—"He will act with fairness and justice between his client or employer and the contractor when dealing with contracts."

Section 16—"He will not accept commissions or allowances, directly or indirectly, from contractors or other parties dealing with his clients or employer in connection with work for which he is responsible."

Rules of Professional Conduct—Rule 1—"He will be guided in all his relations by the highest standards."

Rule 4—"He will not offer to pay, either directly or indirectly, any commission, political contribution, or a gift, or other consideration in order to secure work, exclusive of securing salaried positions through employment agencies."

Rule 29—"He will not accept personal consideration in any form. This assures that his recommendations for the award of a contract cannot be influenced."

Discussion:

The question of when a gift is intended to or becomes an inducement to influence one's impartial decision, as distinguished from an expression of friendship or a social custom,. has remained a perplexing one over the years. No blanket rule covering all situations has been discovered. The size of the gift is usually a material factor, but must be related to the circumstances of the gift. It would hardly be felt a token gift, such as a cigar, a desk calendar, etc., would be prohibited. It has been customary in the business world for friends and business associates to tender such tokens of recognition or appreciation, and "picking up the tab" at a business luncheon or dinner is commonplace and well accepted in the mores of our society.

Recognizing the difficulties inherent in passing judgment on each instance, we believe the Canons and Rules state, in substance, that an engineer may neither offer nor receive a gift which is intended to or will influence his independent professional judgment. The full application of this principle requires the impossible—that we read the state of mind of the donor or donee. Therefore, we must apply a criterion which reasonable men might reasonably infer from the circumstances; that the giving or acceptance of the benefit be a matter of "good taste," and such that among reasonable men it might not be of a nature which raises suspicions of favoritism.

Applying these general principles to the situations at hand, we think that an occasional free luncheon or dinner, or a Christmas or birthday present when there is a personal relationship is acceptable practice. On the other hand, cash payments to those in a position to influence decisions favorable or unfavorable to the giver are not in good taste and do immediately raise a suspicion that there is an ulterior motive. Likewise, a very expensive gift has a connotation of placing the recipient in a position of obligation.

(Continued on page 63)

New Literature

ELECTRICAL WIRING—A new 16-page manual just released by the manufacturer explains the use of hollow core precast concrete floor and roof slabs as raceways for electrical wiring. Covered in the book are: (1) Ways to get wiring in and out of the hollow cells; (2) how to feed fixtures from the cell; and (3) other methods commonly used for electrical wiring. Each section is clearly illustrated with detail drawings and explained in concise, easy-to-read language. Designed as authoritative help and information for architects, contractors, engineers, electrical contractors and related trades.

(Circle 15 in Readers' Service Dept.)

AIR HANDLING TROFFER—A complete 20-page brochure on the subject of combination air-handling troffers. Sylva-Flo troffers with Multi-Vent provide maximum operating performance with economy for both lighting and air conditioning. Brochure contains many illustrations and technical information in the form of tables and charts covering photometric and air distribution data plus specification details and was issued recently by Sylvania Lighting Fixtures.

(Circle 16 in Readers' Service Dept.)

DIMMERS—Kliegl Brothers, manufacturers of lighting fixtures and control systems, has just published a complete catalog of U/L Approved Control Systems for theatres, TV studios, school and college auditoriums, restaurants, clubs, etc. The new manual features the recently U/L Approved "SCR" Dimmer based on a design that was developed and introduced by Kliegl back in 1958. With the U/L approval of these silicon-controlled rectifier dimmers, complete dimming systems are now available for the first time with the U/L label. User can specify a complete system that will meet local building codes, fire and underwriters requirements. The new 38-page catalog, attractively printed in two colors, also covers, in detail, autotransformer dimmers, "Safpatch" and "Rotolector" cold patching (contact made in a de-energized circuit) systems, consoles, programmers together with complete product and system specifications.

(Circle 17 in Readers' Service Dept.)

CARDINAL CATALOG—Cardinal Engineering Corporation has just released a multi-colored, illustrated 24-page consolidated catalog. This all-new pocket edition includes specifications and information on the complete line of cardinal products used for masonry, concrete and stone cutting. Cardinal equipment includes the workmaster, junior and blokmaster masonry saws—the cretemaster and cretemaster junior concrete saws and the Cardinal stone saw for utility cutting. In addition, Cardinal manufacturers a complete line of diamond and abrasive blades for masonry cutting and concrete cutting, small abrasive blades for power hand saws, and diamond blades for stone cutting. Cardinal abrasive blades for masonry cutting are available as red/line externally reinforced blades for safety and durability; nonbrak internally reinforced blades for maximum safety and endurance; abrasive for initial economy. Another portion of this catalog includes a handy reference blade selection chart.

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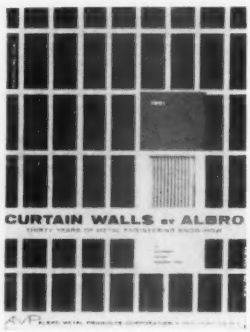
CURTAIN WALL—A new, 16-page illustrated color catalog describes to architects, contractors and owners the



case history use of metal curtain walls in commercial, monumental and institutional structures by Albro Metal Products Corporation. Cross-sectional drawings, photographs, application are used throughout the catalog. Examples are given of Series 100 (large flat panels for enclosing medium and high-rise structures), Series 300 (structural aluminum grid system for low-rise buildings), Series 400 (commercial grid for medium and high-rise buildings). General specifications, a list of representative Albro installations and photographic examples of some of these installations complete the catalog.

(Circle 19 in Readers' Service Dept.)

TEMPLATES—A template for dual duct air conditioning layouts is being offered to architects, engineers, and contractors by Buensod-Stacey Corporation, pioneers in the development of Dual Duct systems. The template, made of a flexible, translucent plastic material, has both 1/4" and 1/8" scales. Openings in both scales are provided for all available air mixing units, from 60 CFM to 4000 CFM. The manufacturer says the template "will prove to be an invaluable tool in the hands of those who lay out dual systems, both as a time-saver and an instrument for the exact scale reproduction of air mixing units."

(Circle 20 in Readers' Service Dept.)

MOISTURE DENSITY—The TESTlab Corporation announces the availability of a twelve page technical brochure titled Moisture-Density Determinations for Civil Engineering Works. The brochure describes in detail an improved nuclear system for taking rapid field measurements of soil moisture content and soil density. The system consists briefly of a radioactive source, a detector for the source and a scaler to indicate the amount of radiation detected. A relatively inexperienced operator can successfully use this completely portable system to obtain moisture or density determinations in a fraction of the time required by other methods. The equipment has wide applications in highway building and dam construction. It has been successfully used in determining density of asphaltic pavements and other material. Its uses in agricultural studies are tremendously varied, being used for controlled experiments on the relation of moisture to plant growth, studies of ground water movements and irrigation projects. Other material covered in this new brochure include balloon density apparatus for determining accurately the volume of holes, other highway compaction apparatus and a new laboratory oven.

(Circle 21 in Readers' Service Dept.)

VALVES—The Henry Pratt Company has published a new bulletin which describes the completely new designs in Rubber Seat Butterfly Valves. The Pratt adjustable seat design is said to make possible the most precise fitting of disc to seat. Completely bubble-tight seating is assured. Although seat and disc are precisely fitted and adjustment screws are tightened and locked at the factory, adjustments can easily be made in the field if slight leakage should occur. The rugged and precise "Anvil" seat is locked-in and adjusted by simple and powerful holding and adjusting segments. The seat cannot be forced out by pressure, velocity or vacuum. Where the downstream side of closed valve is accessible, adjustments can be made with upstream side of the valve under pressure. If the seat is damaged by foreign material in the pipeline, replacement of the seat can be accomplished without dismantling the valve.

(Circle 22 in Readers' Service Dept.)

ENGINE SAFETY—A new 60-page catalog, offering more complete information on Robertshaw-Fulton's all-pneumatic engine safety control system than has been previously available, is now available from Robertshaw's Fulton Sylphon Division. The new Catalog J contains full descriptions of a number of complete systems incorporating safety shutdown or warning upon malfunction of measured variables such as temperatures, pressures, levels, speeds, vibrations, etc., are also described fully.

(Circle 23 in Readers' Service Dept.)

PUMP DRIVES—A comprehensive technical and descriptive color brochure of 20 pages, covering all the

various lines of U.S. pump motors and drives, has been released by U.S. Electrical Motors Inc. For the first time in a single brochure, data on all the U.S. Motors lines in the pumping field is now available to expedite the selection of the optimum motor or drive for each specific pump application. The new brochure is indexed so that motors and drives may be identified as to construction type, enclosure thrust, and U.S. type designation. Having found in the index the motor with the desired characteristics, users of the new brochure will then be able to turn to pages giving illustrations and descriptions of the particular line or lines applicable. Condensed specification data on the various U.S. pump motors and drives include ratings, dimensions, thrust capacities in pounds, speeds, frame sizes, ratios and selection charts (for gear drives), and electrical specification material.

(Circle 24 in Readers' Service Dept.)

ELECTRICAL CONDUIT—Transite Conduit Types I and II are completely described in a new Johns-Manville brochure, TR-247A. Type I is a thin-walled, asbestos-cement conduit for installation in concrete, and Type II is a thicker-walled conduit for direct burial. The 12-page brochure contains considerable reference data of use to designers, specifiers, and purchasers of electrical duct. A handy table lists the most important conduit requirements and the accompanying properties and performance factors of Transite conduit that fill these requirements. In addition, other advantages of Transite Conduit, such as reduction of joints because of long lengths, wide range of standard fittings, and ease of cutting and machining, are spelled out. A table of shipping weights and dimensions, as well as a complete list of fittings, is included. The bulletin covers models from 3" to 144" and for pressures from vacuum to 150 psi. Also includes dimensions.

(Circle 25 in Readers' Service Dept.)

COMMUNICATIONS SYSTEMS—A brochure describing the functions and responsibilities of Philco Corporation's Communication Systems Division is now available. The division, which is one of five of Philco's Government and Industrial Group, is a managament orgainization whose primary responsibility is the technical management of large and complex communications systems for both government and industry. This work covers all phases of electronics, including engineering, procurement and installation. Among the major tasks accomplished by the Communications Systems Division are, Defense Communications Control System, the Caribbean Keying Link in Puerto Rico for the U.S. Army, the U.S. Air Force Criticomm Improvement Program, the Quick Fix phase of the modernization of the U.S. Air Force's Aircom communications system, microwave intra-station communication linkages for the Strategic Air Command at several of its bases under Project Short Order, and Siskiyou Telephone Company microwave system which is one of the longest independent toll line systems in the United States and is located in Northern California.

(Circle 26 in Readers' Service Dept.)

These listings are informational only and are not an endorsement of the products, nor of the manufacturer's claims. To receive any of the new literature described in these columns, merely circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

New NSPE Film To Be Premiered at Fall Meeting

A premiere showing of the new NSPE film "George Spelvin, P.E.," will be given at the Fall Meeting in Roanoke, October 19-21.

The 25-minute color film on professionalism for young engineers represents the first phase of the PR Committee's long range program directed toward various segments of the "public." The other five segments have been listed by the PR Committee as NSPE members, engineering management, PE nonmembers, nonregistered engineers, and the general public.

The film has been developed to reach engineering school seniors and juniors—as well as newly graduated engineers—with a description and explanation of some of the more important elements of engineering professionalism which they should begin to recognize and practice early in their careers. The PR Committee has termed the film "an aid in bringing the engineering student into the orbit of professional consciousness."

The film involves a young engineer who has been on the job for about five years. He is engaged in a project requiring a fuel handling memory and control system for a nuclear power plant. While he is working on the final specifications for the design prior to putting his PE seal and signature on them, the film goes back into his life to illustrate certain episodes which have contributed to his awareness of engineering as a profession, some of the decisions which have brought him to a professional status, and the satisfactions which this professional status gives him. Through the use of a fast-paced sequence of scenes with narration and dialogue, the film covers such professional factors as ethics, graduate education, the EIT examination, participation in civic affairs, registration, public speaking, and the importance of personal broadening in fields outside the technical area of specialized engineering work.

Prints of the film, "George Spelvin, P.E.," will be available to local chapters and state societies for showing at engineering schools, or

Action

Roll 'Em

Above, an engineering office conference scene from the second NSPE film, "George Spelvin, P.E." The scene involves a chief engineer who announces to his staff that their firm has won a contract for a nuclear reactor control unit. At left, a production crew during the filming of one of the sequences made on the sound stage of Norwood Productions in Washington, D.C. All the scenes in the film appear to the audience from the point of view of the young engineer, George Spelvin. In other words, the audience sees the events which take place through Spelvin's eyes.

at meetings with groups of EIT's or other recent engineering graduates. Letters describing the film will be sent to all engineering school deans. Promotional materials concerning the film will be sent to NSPE affiliates. Printed matter on engineering professionalism for audience distribution will be sent to chapters requesting the film.

Further details concerning the availability of the film will be published in the October issue of the AMERICAN ENGINEER.

Pennsylvania Professor Receives Double Honors

The Fayette Chapter, Pennsylvania Society of Professional Engineers, recently honored Professor Charles W. Trinks, internationally

Prof. Trinks

known engineer and professor emeritus of Carnegie Tech with the presentation of a plaque which dubbed him "an outstanding citizen, engineer and educator." The award recognized "his activities as a member of the chapter and his contributions to engineering and scientific development to industry."

Just shortly before he received this honor, the Producers Council, Inc., Pittsburgh Chapter, had enrolled the professor's name in the Hall of Fame as a consulting and professional engineer.

Professor Trinks, who came to this country from Germany in 1899, had written many books on furnace design, which have been translated into seven foreign languages. His recent honors are additions to the long list he had previously acquired, some of which are: Fellow in ASME, Junior Chamber of Commerce "Man of the Year" for 1960, and an annual award made by *Industrial Heating* in his name to engineers who have made outstanding achievements.

Thoughts on Professionalism...

By PAUL H. ROBBINS, P.E.
NSPE Executive Director

Ploughs and Stars

THE increasing importance of engineering today is, of course, not limited to the United States. In many other countries concern is being given to creating a professional atmosphere in which engineering brainpower can be mobilized to the highest degree. In a recent publication of engineers in Great Britain, a commentary with the above title made some observations pertaining to the profession which appear to apply the world over. The following extracts from the *The Professional Engineer*, a publication of the Engineers' Guild of Great Britain, are thought provoking for the engineers of our Nation.

> SOME say that the Russians, ruthlessly concentrating their resources on the showiest of all enterprises, have stolen an unfair march on the West by putting a man into orbit. . . . Engineers may be inclined to think that the occasion should provoke a sober and steady look at the conditions which have led to such tremendous growth and progress in applied science in the Soviet Union. Even when it is acknowledged that Russian technical achievement is very patchy, that an absurd secrecy obscures much of the work, and that all is overlaid with political propaganda tricks of the most blatant, childish and generally successful kind, the solid fact remains: They set out to excel at space rocketry, and they succeeded.
>
> IN the West—and in the East, too, for that matter—nobody but the engineer himself really knows, from day to day, whether he is working under conditions that provide him with the opportunity and incentive to give of his best. Neither his lay employers, nor his political leaders, can compel him to have new ideas, or tell how many he ought to have. They cannot know whether he is doing well or badly until a separate group, of comparable size and resources, is seen to be doing better, or worse. By then it is generally too late to do anything about it.
>
> THE question that managers must ask themselves is this: Do we encourage—do we even allow—our professional engineers to act professionally? And the question that engineers must ask is this: Do we demand our proper scope with sufficient energy? In the West, commercialism, complacency and fragmentation of effort are our dangers. No doubt these are paralleled in Russia by the equally fatal opposite diseases: Monopolism, anxiety and overcentralization. But the hopeful feature in all this is one that only the dedicated engineer can properly understand. However and wherever the true engineer is doing his job, his delight is not in outwitting his rival or in serving some cause or in accumulating wealth, however much he may enjoy these incidental results. He wants, in the end, to know that he has rearranged some part of the physical world in a new and better way than anyone has managed to do before. This urge is not merely harmless—it is the one positively uniting force in the whole sphere of purely material coexistence.—**End.**

Mississippi Society

Professional Engineers in the Jackson area received their Jackson Chapter charter from the Board of Directors of the Mississippi Society of Professional Engineers at the Society's summer meeting July 13 at the Edgewater Gulf Hotel. Chapter officers elected were (l.-r.) S. C. Commander, member of the state board of directors, O. G. Maganos, member of the chapter board of directors, P. A. Koonce, president, A. W. Hardin, secretary-treasurer, and President-Elect Eugene M. Johnson (not shown).

AE Goes Travelling

Shown right is the U.S. Department of Commerce's traveling exhibit of trade publications, which includes a copy of AMERICAN ENGINEER. The Commerce Department sends one of its officials with several United States business men on trade missions, to confer with business leaders in various countries, in order to encourage imports and exports. Usually a Trade Information Center is set up at a trade fair in the country visited. Business men in these countries are interested in reading AMERICAN ENGINEER and other business publications to gain greater knowledge of our industry. This picture was taken at the recent International Trade Fair held in Seattle.

Nassau County Chapter

Guest speaker for a recent Nassau County Chapter, New York State SPE, meeting was General William Whipple Jr., chief engineer of the World's Fair Corporation. The theme of his presentation was "Engineering Planning for the 1964-65 World's Fair." A great deal of interest in the forth coming event was stimulated among the members by the presentation. (For AE coverage of the World's Fair, see page 30.)

Roanoke Prepares for NSPE Fall Meeting

The Fall Professional Meeting of the Society will be held this year at the Hotel Roanoke, Roanoke, Virginia, October 19-21.

This meeting gives promise to be one of the largest winter meetings in Society history, as it will be held jointly with the Virginia Society of Professional Engineers and the American Institute of Architects (Virginia Chapter). There will be extensive exhibits by leading firms, and an unusually fine social program.

The General Meeting Committee is finalizing the professional portions of the program, as well as lining up a nationally known speaker for the major address. The full details of the program will be carried in next month's issue of the magazine.

Fall is one of the most pleasant times of the year in the state of Virginia. It is anticipated that a large number of ladies will be in attendance, and you are cordially invited to bring your lady with you to this meeting.

Chicago Chapter

Chicago Chapter, Illinois SPE, honored its past presidents with a presentation of the newly designed silver NSPE shield lapel buttons. Shown here are:

L. M. Spurling, 1944; John Dolio, 1953; George Chlebicki, 1959; C. A. Walls, 1950; W. Wayne Wallace, 1947; Frank W. Edwards, 1952; George L. DeMent, 1951; Karl C. Hoeglund, 1954; John G. Duba, 1957; Virgil E. Gunlock, 1949; Gerald M. Marks, 1960.

San Fernando Chapter Gives Recognition Awards

The San Fernando Valley Chapter of the California Society of Professional Engineers recently awarded to three valley high school seniors trophies and cash prizes in the sixth annual Student Recognition Awards Contest.

Rules of the event required that participants had followed a course of study which would qualify them for pursuit of an engineering or scientific career in college. Selection of the winners was based on academic excellence, a written essay, and a personal interview. The three winners were George Sudikatus, Jr., of Sun Valley H.S., Robert Fine of Birmingham H.S., and Claude M. Fligg, Jr., Burbank H.S.

According to Donald May, chairman of the Job-Finding Committee of the Chapter, all three students will receive a job opportunity for work during the summer which will be connected in some way with their chosen field.

D.C. Registration Board Moves on Infringement

A recent order by the Washington, D.C., Department of Occupations and Professions requiring that all applications for licenses be sent to the Department's investigation section for a check before any action was taken, brought sharp criticism from two leading members of the Board of Registration for Professional Engineers.

Donald Marlowe, dean of the School of Engineering and Architecture at Washington's Catholic University and secretary of the Board of Registration said that the order was "unnecessary with respect to our board and will only result in additional delays."

Professor Lee J. Purnell of Howard University, also in Washington, D.C., and chairman of the Board of Registration added to the charges that the proposed directive should have been discussed with the boards before it was issued.

"The Department of Occupations and Professions was supposed to be a housekeeping agency, but it has continued to exceed its authority," Purnell added. "The situation is getting worse and worse all the time."

The directive was issued by Robbert F. Cogswell, director of the Department of Occupations and Professions, who justified the proposed program by saying that a survey showed that usually through fraud, psychotics and untrained persons with long criminal records have succeeded in a few instances in getting licenses in the District to practice professions in which they are entrusted with human lives.

The proposed directive was also attacked by boards responsible for the registration of undertakers, doctors, architects, nurses, barbers, and others. In each case it was claimed that the directive would be a usurpation of authority which rightly belonged with each individual board.

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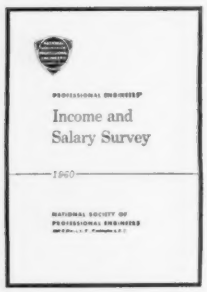

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Nassau County Chapter Honors Two Individuals

The Nassau County Chapter of the New York State SPE recently made two individual awards for accomplishments which have aided the improvement of the profession.

Charles H. Weckerle of New Hyde Park, N.Y., was awarded a life membership by the Chapter at a dinner meeting in Westbury, for his work in the profession and the society. A charter member of the Nassau County Chapter, he began his career as a surveyor's helper and continued to become village engineer of his home town for eight years and later was active with the Planning Commission.

Thomas Miner, a physics teacher at Garden City High School, was named by the Chapter to receive the award as "Science Teacher of the Year." Miner received his B.S. from Middlebury College and his M.A. from Cornell before becoming a high school physics teacher. He is a member of the New York State Regents Committee and the Sylabus Committee of the State Department of Education.

St. Louis Chapter Sets Program for Scholarship

The St. Louis Chapter, Missouri SPE, has established a policy for the administration of the Engineering Education Award which would assure that the award will go to an individual who would receive maximum benefit from it.

Under the recommended plan of action, the cash award would be intended as a grand-in-aid to promote the continuance of a deserving student's education in his upper class years. The award would be administered through the Education Committee of the chapter and would at no time be less than $100, which sum should be increased as soon as possible. The awards are made annually to engineering students at St. Louis or Washington universities who are recommended by their respective deans of engineering.

Presently under the direction of Jay R. Goldman, assistant professor of industrial engineering at Washington University in St. Louis, the program has met considerable success in the recent months.

A. G. Stanford, P.E., Past NSPE Head, Dies

A. G. Stanford, P. E., vice president of Robert and Co., Inc., died recently. A graduate of Clemson College, he served as first president

Mr. Stanford

of the Georgia Society of Professional Engineers in 1944 and as president of the National Society of Professional Engineers in 1949. He was a member of the American Institute of Electrical Engineers, having served as Georgia chapter chairman, Society for the Advancement of Management and Atlanta Personnel Club.

Charleston Chapter

Delegates to the 1961 annual convention of the South Carolina SPE visited the submarine tender, USS Gilmore. Shown are Capt. R. C. Gillett, USN, commanding officer of the Gilmore, and W. C. Lewis, retiring president of SCSPE.

California Society

At the annual meeting in Monterey of the California SPE Steven H. Sassoon, president of the Monterey Bay Chapter, welcomed Noah E. Hull, past NSPE president, Mrs. Hull, and John Stufflebean, vice president, Western Area, in a scene at California's first theatre.

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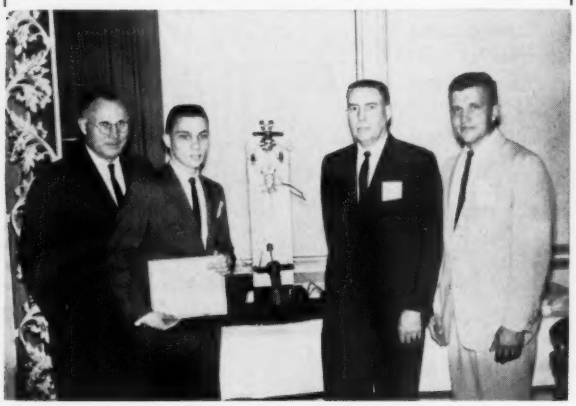
Western Chapter



W. W. Strong (l.), high school science teacher, sponsored Paul Hoyt as he received the Western Missouri SPE Science Fair Award from Jim Lorenz, member of the Education and Vocational Committee at a recent dinner meeting. Shown also is Paul's father.

Maryland Society

Leonard R. Mann (l.) was toastmaster at the annual banquet of the Maryland SPE at Annapolis recently when Dr. A. Allan Bates (r.), vice president of the Portland Cement Association spoke on "An Engineer's View of Russia, 1960."

Young Engineers Survey Western Chapter Members

As part of a young engineers program, the Young Engineers' Committee of the Western Chapter, Missouri SPE, organized a survey of chapter members on their activities, within and without the profession and their attitudes toward many factors dealing with the profession.

W. Albert Waas, chairman of the committee, reported 260 returns out of the 500 questionnaires sent out. The entire project, developed and carried out by young enginers in the chapter, was used as the program for Young Engineers' Night.

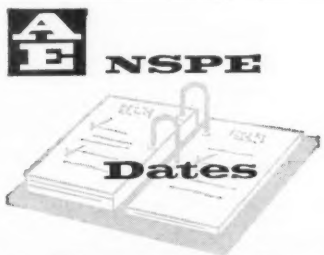
Among some of the interesting factors revealed by the survey were:

- A majority reported that employers encouraged registration, permitted time off for outside technical activities and kept them adequately informed on the status of the company.
- A majority reported activities in church of civic organizations.
- The average length of time a member was kept from home on business was 3.8 days monthly.
- In political preferences, 178 listed Republican, 41 Democrat; 251 out of 267 had voted in the last election, but only 12 had ever run for public office.

The results of the survey can be used as a basis for planning chapter and committee activities in the future, particulary since members who replied were quite extensive in their answers.

Ohio Northern U. Has First Student Auxiliary

The first auxiliary to an NSPE student chapter has been formed at the Ohio Northern University. The group was accepted by the ONU Student Chapter in May of this year. Their purposes in forming the organization were to meet and acquaint themselves with other wives of ONU engineering students; to meet for social purposes; and to assist in the social activities of the Ohio Northern Student Chapter of the Ohio SPE.



to Remember

West Virginia Society of Professional Engineers—Annual Meeting—October 5, 6, Morgantown, West Virginia.

Virginia Society of Professional Engineers—Annual Meeting—October 19, Hotel Roanoke, Roanoke, Virginia.

National Society of Professional Engineers—Fall Meeting, October 19-21, Hotel Roanoke, Roanoke, Virginia.

Parke, Davis Receives Michigan Society Award

The Michigan Society of Professional Engineers announced recently that Parke, Davis & Company, of Detroit, had been selected for the 1961 Michigan Industrial Professional Development Award. Merle Powers, president of MSPE, said Parke-Davis was honored "in recognition of an outstanding record in the development and use of engineering employment practices in accord with professional standards."

The MSPE established the award this year and it will be given annually to the Michigan firm which has done the most to promote professional development in the field of engineering. Powers said the award was given to Parke-Davis because of the worldwide pharmaceutical firm's professional engineers employment policies; encouragement of professoinal development of engineers through registration, greatest percentage of registered engineers; sponsorship of refresher training courses; public recognition to engineers of achievement; and urged membership and participation in professional engineering groups for continued self-development and post graduate study.

NSPE news briefs

• The **Montana Society** recently announced the officers for the coming year as Ed Waldo, Billings, president; A. W. Clarkson, Helena, vice president; Harry Schmitt, Billings, secretary-treasurer; C. W. Brinck, Helena, national director. Officers were installed at the recent annual meeting of the state society, at which time the group also dealt with such problems as professionalism versus unionism, ethics and other matters.

• The board of directors of the **Wisconsin Society** recently passed a resolution recognizing the need for engineers and engineering educators and urging those who influence the expenditure of state educational funds "to assure adequate resources whereby our state and private educational institutions can attract and retain competent and skilled educators to meet the need for engineering talent."

• At the annual state convention of the **Illinois Society** in Peoria, recently Sanger K. Westphal, president of the Joliet Chapter, received an engraved gavel for perfect attendance of chapter delegates at the convention.

• Dr. Robert M. Holcomb of the **Texas Society,** professor at Texas A. & M. College, was recently appointed dean of the SEATO Graduate School of Engineering in Bangkok, Thailand, to succeed Dean T. H. Evans who has just returned to Colorado State University after holding the post for two years.

• Dr. Nathan M. Newmark of the **Illinois Society,** and head of the department of civil engineering at the University of Illinois, recently received the Vincent Bendix Award for outstanding research contributions to his field as an engineering educator. It was presented at the annual meeting of the American Society for Engineering Education in Louisville, Ky.

• M. A. Durland of the **Kansas Engineering Society** has retired from the post of dean of the Kansas State University School of Engineering and Architecture it was announced recently by University President James A. McCain.

• Walker Lee Cisler, president and board chairman of the Detroit Edison Company, was honored by his fellow professional engineers of **Michigan** recently as being the 1961 Engineer of the Year. Cisler received the award for his contributions which have served to advance his profession, his community, and the public welfare.

• Dr. William T. Alexander, dean of the College of Engineering at Northeastern University and a member of the **New York State Society,** has been named administrator of the Webb Institute of Naval Architecture, Glen Cove, Long Island, N.Y.

• Professor Frank Bromilow, head of the civil engineering department at New Mexico State University, and a member of the **New Mexico Society,** will become dean of engineering and director of the Engineering Experiment Station on September first.

• The San Fernando Valley Chapter of the **California Society** recently elected Henrik Ring, Tarzana, as president. Other officers named were Horst Wichmann, Encino, first vice president; Eugene Spearman, Canoga Park, second vice president; William H. Miller, Northridge, secretary; Walter M. Swarthout, Pacoima, treasurer; Patrick Fretto, Northridge, alternate state director; and John E. Ahern, Granada Hills; Ernest R. Gerlach, Van Nuys; Mark W. Peranich, Canoga Park, and Stanley H. Bulmer, Tarzana, as directors.

J. S. Morehouse, P.E.

J. Stanley Morehouse, P.E., dean of engineering at Villanova University, died recently. A graduate of Stevens Institute of Technology, Morehouse had recently served the Pennsylvania Society of Professional Engineers as chairman of the Education Committee. He was a member of the Engineers Club of Philadelphia, ASEE, and ASME.

By Mrs. Clark A. Dunn, Chairman, Ladies Auxiliary Advisory Committee.

From the standpoint of the ladies, the annual meeting of the National Society of Professional Engineers held in Seattle this July was most enjoyable. A vote of appreciation is certainly due Mrs. Edward Kimbark and her committees of ladies for arranging such a varied program for the guests. They enjoyed entertainment which only Seattle can provide. All of the auxiliaries in the State of Washington assisted in the hospitalities by taking charge of certain functions or by making favors.

Every day was filled with an interesting program. Pre-convention activities for early comers included a boat tour of Lake Washington and a progressive luncheon at which the ladies were entertained in some of the loviest homes in Seattle. A special treat was a trip by bus to Snoqualmie Pass, a ride on the ski lift there, and a visit to the Thunderbird Inn on top of the mountain. Other affairs were luncheons at Trader Vics, a world famous Polynesian restaurant, and at the Wharf, Salmon Bay.

The men joined their families on Thursday for a very delightful evening which included a two-hour boat ride on Puget Sound and a salmon bake at Kiana Lodge.

The annual business meeting of the auxiliaries was well attended. The Ladies Auxiliary Advisory Committee is quite gratified by the interest shown in auxiliaries over the Nation. The reports of the six area chairmen show steady growth in all areas, particularly in the State of Washington where five new chapter auxiliaries and a state advisory committee have been organized. This shows what a stimulus

Expiration Dates for State Licenses

The following tabulation of expiration dates of state certificates for the practice of engineering covers those states in which the expiration dates occur during the fourth quarter of the year. Similar lists will be published quarterly in the AMERICAN ENGINEER for the information and convenient reference of registered engineers.

October 31—

New York (biennially in even years)

November 30—

Pennsylvania (biennially in even years)

December 31—

Alabama	Louisiana	Ohio
Arizona	Maine	Oregon
Canal Zone	Minnesota	Tennessee
Connecticut	Mississippi	Texas
Florida	Montana	Utah
Georgia	Nebraska	Vermont
Iowa	North Carolina	Virginia
Kansas	North Dakota	Wyoming (biennially)

it is for the National convention to come to a state.

Officers of the Ladies Auxiliary Advisory Committee were chosen for the coming year. Elected for a second term were: Chairman—Mrs. Clark A. Dunn, 317 North Husband, Stillwater; Central Area Chairman—Mrs. C. R. Hanes, 581 East Dominion Boulevard, Columbus, Ohio; Southwestern Area Chairman—Mrs. John Pratt, 7121 Greenbrook Street, Dallas 14, Texas; and Western Area Chairman—Mrs. Fred M. Johnson, 1034 Princeton Avenue, Modesto, California. Newly elected were: Northeastern Area—Mrs. Leigh E. St. John, 99 Hawley Street, Binghamton, New York; Southeastern Area Chairman—Mrs. Paul R. Speer, 408 Frazier Drive, Chattanooga 11, Tennessee; and North Central Area Chairman—Mrs. R. S. Delamater, 547 S. Hillside, Wichita, Kansas.

The Ladies Auxiliary Advisory Committee desires to serve all of the auxiliaries to the best of its ability. It suggests that any auxiliary president wishing information of any kind write to her area chairman for help. News items are always welcome as they are needed to supply material for this column.

The 1961 edition of *Engineers' Wives* is being published soon. Every auxiliary will find it a valuable aid in its work.—**End.**

CASEY

(Continued from page 26)

Now we need only one card for each item. We can code the name or composition in one portion of the coding space, physical properties in another, functions in still another. We can include other categories also if desired. Also we can make simultaneous multiple selections such as a solvent for hydrocarbon oils, with a boiling point above 200°.

Also, this sort of subject selection can be applied to a bibliographic file. In addition, the first several letters of the author's surname can be coded in such a way that the file can be sorted into alphabetical order by sorting a group of holes in a given order. Similarly, coding the date of publication permits the bibliographic file to be sorted into chronological order.

For most individual files only a small list of subject headings and/or a simple classification scheme will be adequate. The use of too fine classification for information retrieval is fraught with pitfalls. I recommend the use of only a simple, coarse classification and one that is confined to concrete, material things.

The subject headings should not be too specific. For some purposes the combination of relatively few broad generic concepts can be used to indicate specific bits of information. For example, "Thermometer" could be coded as the combination of "Apparatus" and "To Measure" and "Thermal Condition."

So a substance or procedure or event or almost anything else we can think of can be considered a small ultimate unit of information and combined with other small units to make up a more comprehensive, broader concept, or that substance or procedure can be considered a broad concept, made up of many smaller units.

In our ordinary use of language, we are accustomed to thinking of words as symbols for concepts or ideas. We know that many words have a variety of meanings depending on context and what, at the moment, is in the mind of the speaker and listener. So, we speak vaguely of semantics and try to figure out the meanings of words. In subject matter analysis, we are really doing the reverse. Instead of thinking of words and meanings, we should think of the definite concept we wish to designate and then compose a symbol to represent it specifically. The symbol may be a single word, but more likely it will be a group of words or it may be or may include a diagram, picture or mathematical expression. The symbol, however complicated it may be, must be thought of as a single symbol for

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POSITION OPEN to registered engineer; Design-Sanitary, in northern California. CE plus advanced study in sanitary, age to 50. Minimum of 8-10 years practicing experience in dealing with feasibility studies, consulting, engineering services, design and professional counsel to clients on water treatment, sewage and sewers. Also able to direct, layout work and supervise other employees. For a well established consultant—$10,000 to $12,000 per year. Contact Clair A. Hill & Associates, P. O. Box 558, Redding, Calif.

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CURRENTLY EMPLOYED ELECT. ENGR., P.E., age 34. Public Utility experience, desires position with consulting engineering firm. Prefer South or Colo.-New Mex. area. Write Box 903, AMERICAN ENGINEER.

it represents a single concept no matter how complicated that concept may be. For convenience in notation, the symbol may be abbreviated and represented in a "code" by a letter or numeral. The concept, finally, through intermediary symbols, is represented in the "finding device" as a notch or hole in a card or an entry in an index or the label on a pigeonhole.

The need for more instruction in engineering documentation is becoming more widely recognized. Some schools offer courses in engineering literature, others in report writing. However, I know of no courses which include such things as note taking, record keeping, filing and finding information. These things most engineers do more frequently than search the literature or write reports. It seems to me it would be more effective if courses of instruction covered *all* aspects of documentation and, importantly, their interrelations.

Instruction is needed not only for students, but for practicing engineers. Those of us who lacked the opportunity or the wit to take documentation courses in school have found that we had to learn at least some of those things the hard way after graduation.

Our daily documentation chores are just as much a professional activity as designing, constructing or operating a water purification plant.—**End.**

► ***Editor's Note:*** **Mr. Casey's article was so well documented *American Engineer* does not have the space to carry all his references, though we will supply a list of his sources to any interested reader.**

CAVANAGH

(Continued from page 44)

lien covering the advanced patent costs with provisions for eventual liquidation. In cases where submitted inventions obviously cannot be approved from an economic standpoint, or the initial patent search indicates prior conception, a brief report is issued by the board explaining the reasons for rejection.

Subsidies, tax relief, price pegging and import embargoes have frequently been utilized to stimulate cold spots in our industrial fabric and these devices along with others have been utilized solely to indirectly enhance employment.

These steps have been taken by our government without regard to reimbursement. Why not go directly to the well springs of industry and render assistance to our most prolific job maker, especially when means are available for effecting such help with reasonable assurance that the government will be reimbursed for money expended.

The foregoing is presented as an outline of a step toward instituting a policy of government assistance and encouragement for what is probably our greatest asset, The Yankee Inventor.—**End.**

CHAVE

(Continued from page 41)

Development several years ago, the consensus of opinion of a large audience was that it was quite improper for a company to suppress papers merely because there might be some intangible value in the information released, and that in this day and age it was the duty of organizations to reveal what information they could reveal, unless it was clearly evident that they were giving away valuable trade secrets.

From here we tie into the question of authorship of articles. While this is not entirely a matter of commercial interest, I should like to point out that there is still a great tendency, especially in commercial companies but I believe it is possibly true among consulting engineers, too, for the boss to claim credit for an article written by one of his subordinates. It might be possible to present an argument to show that this is larceny.

Of course there are many people of responsibility high in industry who do believe in the interests of their clients or their customers and do decry some of the commercial practices which have been prevalent as regards engineers' products. I need only point, for example, to the ordinary desk lamp socket or the pull chain socket and ask anyone who has taken any one of these gadgets apart if he thinks it's a good, sound product. Those of you who have been in Great Britain realize how much better electrical fixtures they have there, but of course there is a reason. If our junk were used on 230 volts there would be a lot more dead people. None other than a high executive of a large electric equipment corporation stated in an ethics meeting of the AIEE three years ago that he wished the licensing laws were such that those who put out radios with grounded metal cases with only a thin plastic layer to protect the user against 110 volts could be penalized. I'm sure his own organization makes these same radios, and what he was looking for was some over-all authority to

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stop everyone from making them.

This now leads us to a real difficulty. If, by some miracle, a standard code of ethical behavior is adopted for engineers, and I mean by this a code which they can understand rather than the official Canons of Ethics, the salaried employee of an industrial concern will find himself in the position of having to say to his boss, "I will not follow your instructions because they violate my code of ethics." Who has the courage to do this? Furthermore, it raises the question of loyalty. Should we be loyal to our employer or to the engineering profession as a whole? The engineer from Montreal to whom I referred, being a private consultant, felt that we should be loyal to the engineering profession first, last and always. I wonder how the directors and the officers of some of our great engineering corporations would feel about this point.

A SOLUTION, proposed long ago, is to prevent the corporate practice of engineers. This is doomed to failure because modern engineering is not an individual practice. It is ridiculous to imagine a single consultant or a small joint partnership designing a nuclear power plant. While such organizations often claim that construction is not a professional field, the writer is convinced that the large engineering and construction firms are the ones that give the best money's worth.

However, the cost-plus professional job may be doomed for a while as a result of the pressure of government and nontechnical management of clients' companies. The large engineering organizations may become less professional and more commercial. If so, there will be little distinction in working conditions between the employee of the engineering contractor and the employee of the manufacturer. Where does this put the individual engineer?

A few years ago, many were attracted to labor unions. By and large, these unions have not been successful. The labor man just does not have the professional viewpoint. The professional man can't stand the labor viewpoint. He

thinks he is superior to most people, laborers especially.

There is another solution which has been proposed, and that is that we should have an over-all, dominant engineering society which, after careful thought, lays down the rules for professional behavior to all engineers, whether consultants or employed. Naturally these rules will have to vary according to the man's employment. In fact, it would be in a sense a union—not a trade union, because a trade union would be concerned with collective bargaining and setting up people's status in life and the pay that goes with the status—but rather, an organization more like the American Medical Association. Such an organization would have to encompass most of the engineers in the country.

The consulting engineers already think of a society like this, but from their point of view they would throw out everybody who is not a private practitioner. This would be perfectly practical if more engineers were private practitioners but, since only a pitifully small minority are in this class, a consulting engineers' organization could exercise little influence.

Now, the proposed organization would be the one that would command the professional man's loyalty over and above his loyalty to his employer. Do we want that? To an extent we do. Just as the doctor has to report gunshot wounds to the police and is forbidden to prescribe certain drugs or perform certain operations, the engineer has duties to society and his profession which transcend his employment.

With proper guidance, the future professional and ethical status of engineers could come from licensing laws. These laws would require this allegiance to society and impose increasing penalties on the individual engineer for ignoring it. In some states these laws, in effect, make the individual engineer his employer's agent. Smith Engineering is not licensed, but John Jones, P.E., is. It is not the Smith Engineering Corporation, but John Jones, an employee, who puts the professional engineer's seal on Smith drawings. Jones is responsible. It is this requirement that

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may, in time, despite the indignation of the commercial manager, make Jones refuse to go along with commercial practices that violate ethics.—**End.**

LETTERS

(Continued from page 6)

a violation of Army regulations concerning S&E personnel. However, this action is not the exception as there are other S&E personnel in Korea who are not working in the positions to which they were originally assigned.

It would appear that the Army's highly touted S&E program is much better in theory than it is in practice. We feel that both the Army and the S&E personnel involved would benefit greatly by better handling of the S&E Program.

PFC Jerry A. Bradshaw
PFC Robert S. Connor
PFC Edward E. Moore
PFC Edmond W. Overstreet
United States Army Forces, Korea

Since You Asked . . .

Dear Editor:

In his article "The Engineer—A Member of Management?" (AE August, 1961) John D. Kemper, P.E., asks the question, "Would anyone want to disagree with these definitions?" This writer does.

In the first place, the entrepreneuric principals of *any* business were at one time called capitalists. In the course of time and for various reasons too long to dwell upon here, the entrepreneuric principals (capitalists) used a euphemism, namely, management.

At the same time an art was being developed, namely management. This are pertains to the use of scientific tools and methods to the end that natural resources, the forces of nature and human effort be used as efficiently as possible. Observe that management (obviously the domain of the professional engineer) is independent of any economic structure. For example, the American Management Association in one of their recent publications stated that Soviet managers are highly skilled practitioners of the art.

The error that Mr. Kemper unwittingly makes in his well intentioned article is that he makes no differentiation. For example, he uses the euphemism "management man" which originally was "company man"; however, the semantics does not stop there. It is well known that the company man seeks to identify with the entrepreneuric principals but in indiscriminate choice of words such as

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"management man" and "management" one may be led to believe that management must identify with the entrepreneuric principals.

BERT ROSS, P.E.
Schenectady, N.Y.

BER

(Continued from page 45)

Conclusions:

Situation "A"—Occasional free luncheons or dinners and Christmas presents of relatively small value do not exceed the bounds of ethical behavior by the giver or receiver.

Situation "B"—Inasmuch as it does not appear that the employees performed any services for the cash gifts, and in view of their position of responsibility and trust to the employer, the receipt of such cash gifts immediately raises a doubt as to the integrity of the employees and leaves an impression that the intent is to influence their discretion in favor of the giver. Acceptance of cash gifts in such circumstances is an unethical act.

Situation "C"—It is unethical to offer or receive such a gift. It is conceivable that the expensive gift was tendered in good faith, honestly expressing appreciation for the cooperation and assistance of the chief engineer. Nor is there any direct evidence or implication that the consulting engineer would receive preferential treatment in any future work for the company. On the other hand, the chief engineer presumably had a duty to cooperate with the consulting engineer, in the interest of an efficient job by the consultant. And it might be inferred by reasonable men that one who had received an expensive gift would be under at least moral pressure in any future consideration of awarding additional

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work to the consultant. Here, we apply the concept of "good taste" and conclude that the chief engineer should decline the gift, thereby protecting his good name and reputation, and that of his profession, from any shadow of suspicion. In accepting such a gift he might not sully his character (what he is) but he would run a definite risk of besmirching his reputation (what others think he is). For the same reasons the consultant should not tender gifts of such magnitude, even though he sincerely acts with the best motives.

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Note: *Member Elliott makes the following additional statements: In connection with the conclusion in Situation "A," I would like to stress the occasional free luncheons or dinners and would omit Christmas presents almost irrespective of value unless they are items which are generally distributed as advertising material by the company. I feel very strongly that Christmas presents should neither be given nor received by engineers under the circumstances.*

SPECIAL REPORT

(Continued from page 42)

these organizations need an independent mechanism for being heard that is influential at the level where decisions are made affecting the multifarious terms of engineering employment."

That "innovative thinking about engineer-management relations is urgent" is beyond much dispute, but the author's own observations and conclusions seem to contradict his conclusion that the further research, innovation and experimentation with a variety of employee organizational forms should include collective bargaining. If, as said, experience is the great teacher, the lesson should have been learned by now that the road of unionization is the road of frustation and despair for those whose primary thrust is toward professional recognition and status.—MFL

LAW

(Continued from page 33)

the applicability of the Federal law to professional services is the fact that some states have anti-trust laws and these, too, must be checked carefully in considering the adoption or enforcement of fee schedules. As indicated by recently publicized California attorney general's inquiry into engineering fee schedules, state authorities may take intrastate action without having to prove restraint of trade or commerce among the several states, as required under the Federal Law.

The pharmacists case has no direct connection for the engineering profession, but out of it may emerge general principles of law which will control or influence the future of engineering fee schedules.—MFL

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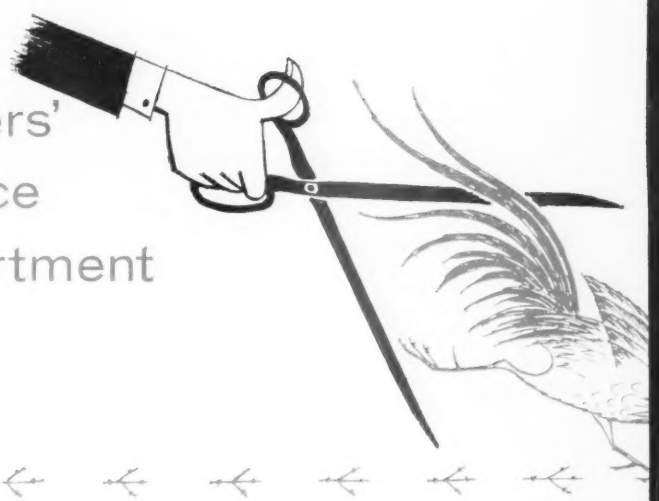

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September, 1961

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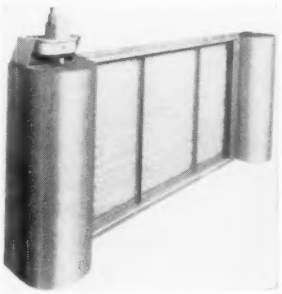
Progress in Products

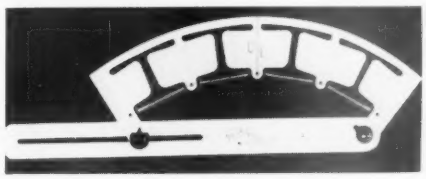
AIR FILTER — Item 30

A new, more versatile roll-type air cleaner that will operate efficiently anywhere has been announced by the Farr Company of Los Angeles. Known as the Roll-Kleen Model H-5 is available with automatic (motorized and controlled operation) or manual drives, with or without media covers on either or both ends, and is manufactured in 84 standard sizes. These features, make the H-5 well suited for use with the latest model air handling devices.



ACU-ARC RULER — Item 31

Hoyle Engineering Company announces the development of the new Acu-Arc Ruler, a device designed to provide the draftsman with a rapid and accurate means of drawing arcs of circles of large radii. Acu-Arc Rulers are used to draw arcs of circles of any radius from 7″ to 200″ or more with ease even if the center point of the circle is beyond the edge of the drawing surface.



SAFETY SWITCH — Item 32

A new water level safety switch preventing pump damage due to insufficient liquid at the source, or when pump loses its prime, has been announced by U. S. Gauge Division, American Machine & Metals, Inc. Designed for installations where bearings, packing glands and motor windings depend on pumped water for lubrication and cooling, or where insufficient water flow could damage parts, the USG device senses liquid flow by measurement of discharge pressure and automatically shuts system down when water level gets too low.

TRANSFORMER — Item 33

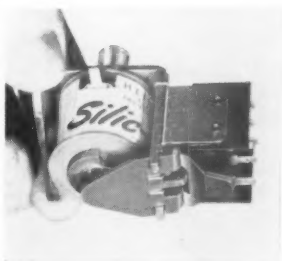
A new high capacity do-it-yourself transformer, called the Flexiformer Packaged Transformer Primary type TP1000, is designed to be used as a temporary or permanent source of a-c voltage or current transformer. The required number of winding turns are merely hand-threaded through the center opening. When used as a source of a-c voltage, the input rating is 120 volts, 50/60 cycles single phase and the output rating is 1000 VA. Each turn of the hand-wound secondary supplies 0.75 volt at 120 volts input.

CALCULATOR — Item 34

Diehl Calculating Machines, Inc. are proud to announce an outstanding achievement in development of automatic desk calculating machines. Diehl have designed and perfected a unique mechanism which automatically selects the fastest way to do any multiplication. Here are some of these time-saving features: A new stepped keyboard and special checking register insures faultless entry of figures, single keyboard multiplication through X and = bars with programmed clearances and accumulations.

TIME-DELAY — Item 35

The Heinemann Electric Company has developed a new hydraulic-magnetic time-delay relay with totally enclosed snap-action contacts. Called the Type "B", the new relay is capable of switching up to 5-amp loads, either SPDT or DPDT. The main advantage of the new contact design is the protection afforded by the phenolic contact housing, which not only prevents environmental contamination, but also eliminates any chance of unauthorized tampering.



TROFFER — Item 36

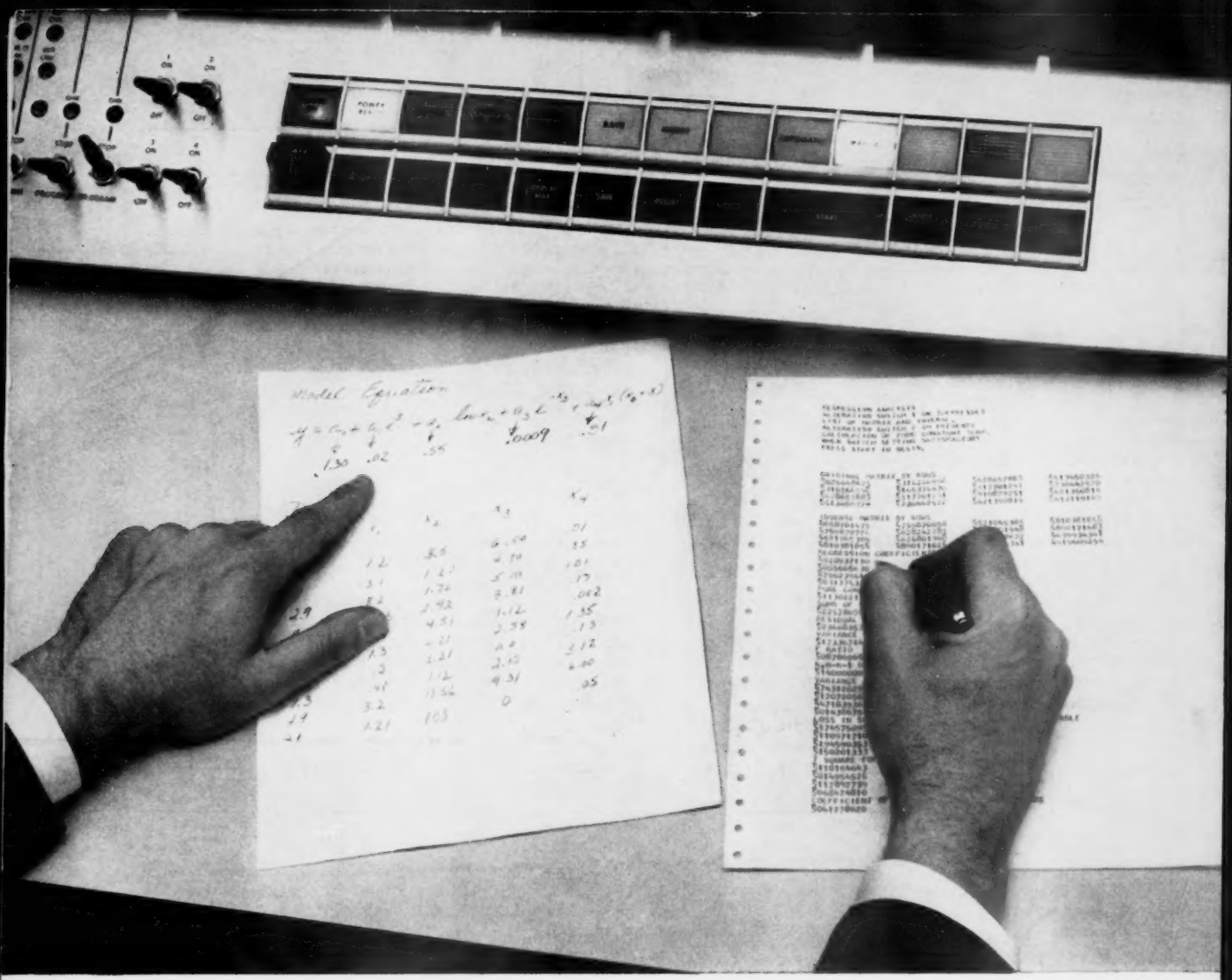
A completely new concept in air-handling troffers called Triple Shell Lumi-Flo has been announced by the Benjamin division of Thomas Industries Inc. and Tuttle & Bailey, division of Allied Thermal Corporation. The units provide light, cool air or warm air from a single concealed ceiling fixture and are perfectly adapted for use in almost any building with any type of drop ceiling. One of the most important features of this new line of equipment is that the air passageway is completely isolated from the troffer housing by fiberglas insulation and an insulating air gap—thus removing the possibility of temperature variations affecting the light output of the unit.

BOILER DESIGN — Item 37

After nearly two years of research and development, Orr & Sembower is now ready to market a new packaged automatic firetube boiler of unusual design and outstanding performance. The new boiler is considerably changed in appearance from previous models. Designated as the powermaster Positive Flow (Model PF), it has burner and furnace located on the left side at the horizontal center line of the boiler. It is of three pass design with no tubes directly above or below the furnace, thus avoiding any impediment to the natural circulation flow. The circulation pattern is comparable to that in a watertube boiler.

This feature describes new products of general interest to professional engineers. For further information, circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

These listings are informational and are not an endorsement of the products, nor of the manufacturer's claims.



Want to find the coefficients? It's easy with the new Regression Analysis program for the IBM 1620

Here's another program offered free-of-charge to users of the IBM 1620 Data Processing System. It gives you the kind of results you might expect only from a much more expensive computer. But users of the 1620 know that its low rental cost is deceptive. The 1620 packs *more computing power per cubic inch* than any other computer in its size range.

The Regression Analysis program is a good example. Suppose you want a fit for production purposes. If you employ more than two variables you probably have difficulty visualizing the representation of your data. If linearity is not the case, you must often guess blindly at a polynomial of high degree, accept or reject the fit with something approaching a sixth sense, and either try again or settle for the results you have.

The new Regression Analysis program lets you handle expressions containing up to 24 *variables*. If you have the even more complicated task of handling many dependent variables, the program will generate regression coefficients with a maximum number of dependent variables not exceeding one-half the number of independent variables.

This program will also fit non-linear functions and hyper-surfaces. Compare this performance with that of any other computer in the 1620's price range.

A basic 1620 installation rents for just $1600 per month. For details, contact your local IBM Representative.

IBM's 1620 is a compact desk-size computer.

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